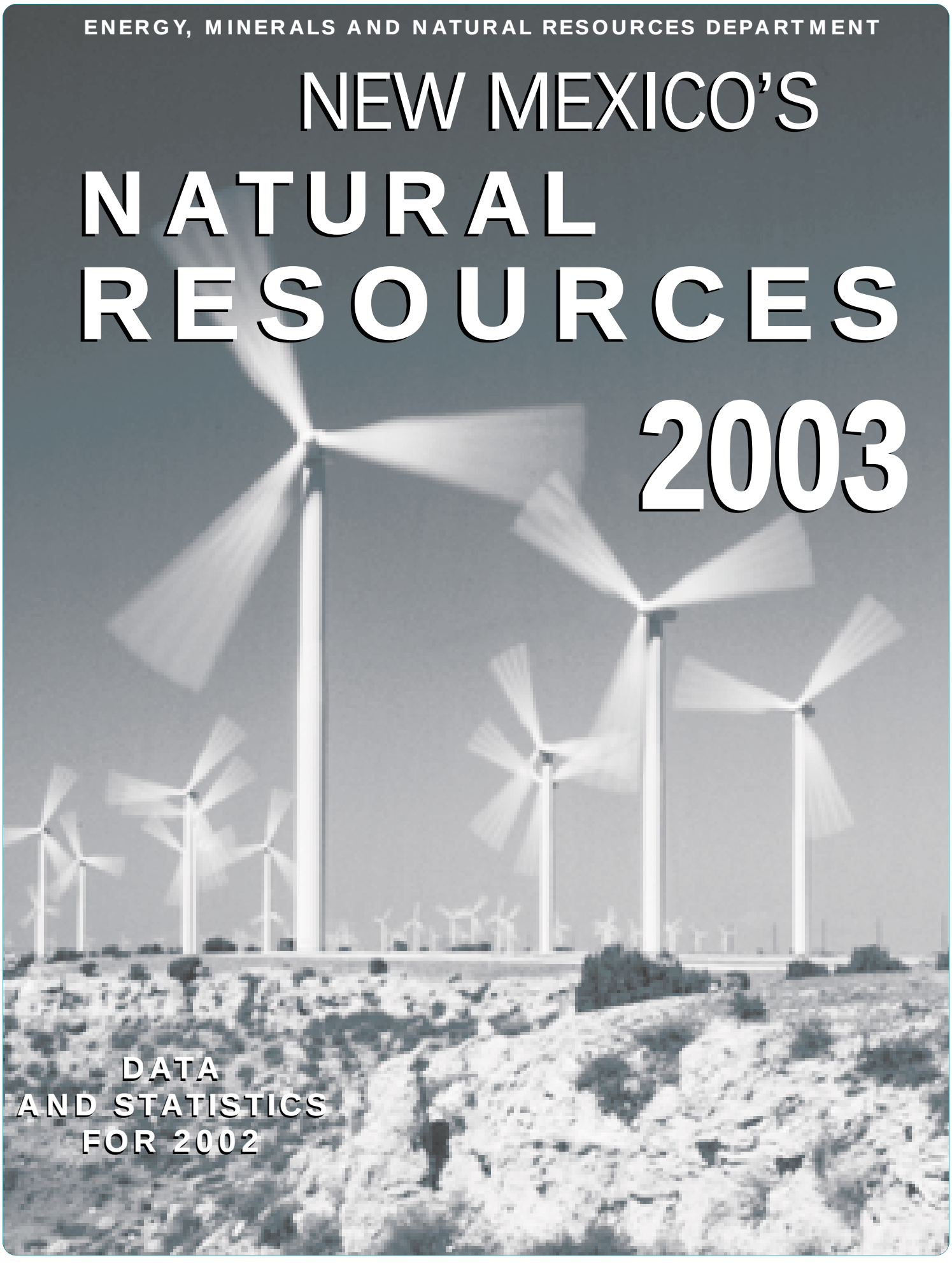
ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT

NEW MEXICO'S NATURAL RESOURCES 2003



DATA AND STATISTICS FOR 2002

OVERVIEW

New Mexico's Natural Resources is produced annually by the Energy, Minerals and Natural Resources Department. It provides information on energy and mineral commodities; renewable and secondary energy resources; energy efficiency and conservation programs; and forestry and state park programs. Statistics and data are primarily for 2002 (the most recent available) with 2003 updates provided.

Table 1. Production and Reserves of Oil, Gas and Coal for New Mexico and the Nation in 2002, Compared with Adjacent States and Wyoming

	CRUDE OIL[1]				NATURAL GAS[2]				COAL			
	PRODUCTION		RESERVES		PRODUCTION		RESERVES		PRODUCTION		RESERVES[3]	
	Million bbls	U.S. Rank	Million bbls	U.S. Rank	Billion cubic ft.	U.S. Rank	Billion cubic ft.	U.S. Rank	Million tons	U.S. Rank	Million tons	U.S. Rank
New Mexico	67.4	5	715	4	1,625	2	17,414	3	29	12	1,385	3
Texas	368	1	4,944	1	5,038	1	43,527	1	45	5	673	8
Oklahoma	58	6	556	5	1,524	3	13,558	4	1	22	18	17
Colorado	17	11	196	12	964	5	12,527	5	35	8	629	9
Utah	12	13	271	8	286	10	4,579	9	25	13	356	14
Wyoming	46	7	489	6	1,388	4	18,398	2	373	1	6,673	1
U.S. TOTAL	1,875		22,446		19,353		183,460		1,094		18,216	

1) crude oil proved reserves and production in million barrels of 42 U.S gallons
2) natural gas proved reserves and production
3) 2002 recoverable coal reserves at producing mines; NM ranks 9th in demonstrated reserves

All data from DOE, Energy Information Administration except NM coal, oil and gas production from EMNRD

New Mexico is an important supplier of energy to the nation. Table 1 shows production and reserves of our extractive energy resources compared to neighboring states. New Mexico is second in natural gas production and third in proven gas reserves. A portion of the gas is classified as coalbed methane, in which the state is first in production and reserves. New Mexico ranks fifth in crude oil production and fourth in proven oil reserves and is a leader nationally in both production and reserves of carbon dioxide (CO_2) which is used to enhanced oil recovery. Coal is another important energy resource. The state ranks twelfth in coal production and third in coal reserves. Although there are not any active uranium operations, the state ranks second only to Wyoming in uranium reserves.

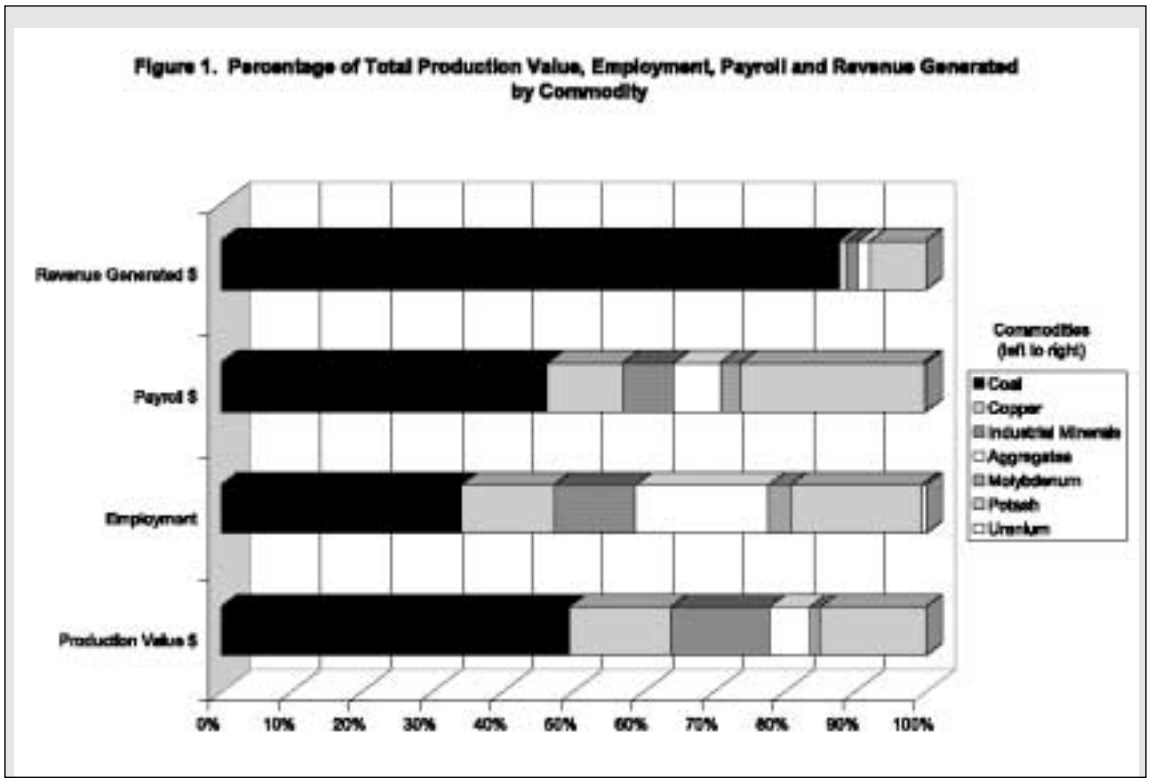
In addition to fossil fuels, New Mexico has significant renewable energy resources, including solar, wind, geothermal, hydroelectric and biomass. For example, the recent development of the third largest wind power plant in the country, a 204-megawatt wind farm located 20 miles northeast of Fort Sumner, demonstrates the great potential of wind energy in our

Table 2. Summary of Production, Production Value, Employment, Payroll, Revenue and Rank Information for Mineral Commodities in New Mexico in 2002

Mineral	Production[1]	Prod. Rank[2]	Prod. Value $	Employment[3]	Payroll $	Revenue Generated $[4]	
						State	Federal
Coal	28,802,231	12	619,436,006	1,763	116,023,271	26,287,729	21,010,230
Copper	247,275,586	3	161,703,990	683	28,773,378	650,890	
Gold	0	-	-	-	-	550	
Industrial Minerals[5]	2,393,754	-	174,603,868	599	17,745,177	620,701	
Aggregates[6]	15,441,510	-	73,499,852	978	18,549,343	883,087	
Molybdenum	3,828,703	5	17,256,856	156	7,000,000		
Potash[7]	1,014,529	1	156,611,426	966	64,557,462	1,871,376	2,401,277
Silver	0	-	-	-	-	204	
Uranium	18,491	2	-	27	966,000	7,932	
TOTAL			1,255,111,827	5,176	248,644,829	30,532,479	23,411,507

[1] Production for coal, industrial minerals, potash and aggregates in short-tons; copper, molybdenum and uranium in pounds.
[2] Rank is based on quantity produced. Source: U.S.Geological Survey (http://minerals.er.usgs.gov/minerals) coal rank is based on DOE's Energy Information Administration (www.eia.doe.gov).
[3] Category includes direct and contract employees.
[4] State revenue includes royalties/rentals from state trust land mineral leases; and severance, resources excise and energy conservation tax revenues. Federal revenue includes 50% state share of federal royalties (Onshore Collections in FY 2003). State data from NM Tax and Revenue Department and the State Land Office; Federal data from Minerals Management Service.
[5] Category includes gypsum, perlite, salt, limestone, caliche, dimension stone, silica flux, clay, humate, scoria, pumice, mica and zeolites.
[6] Category includes base course, caliche, clay and shale, crushed rock, dimension flagstone, fill dirt, gravel, limestone, red dog, rip-rap, sand, scoria, topsoil, travertine and other.
[7] Production is K_2O mill production.

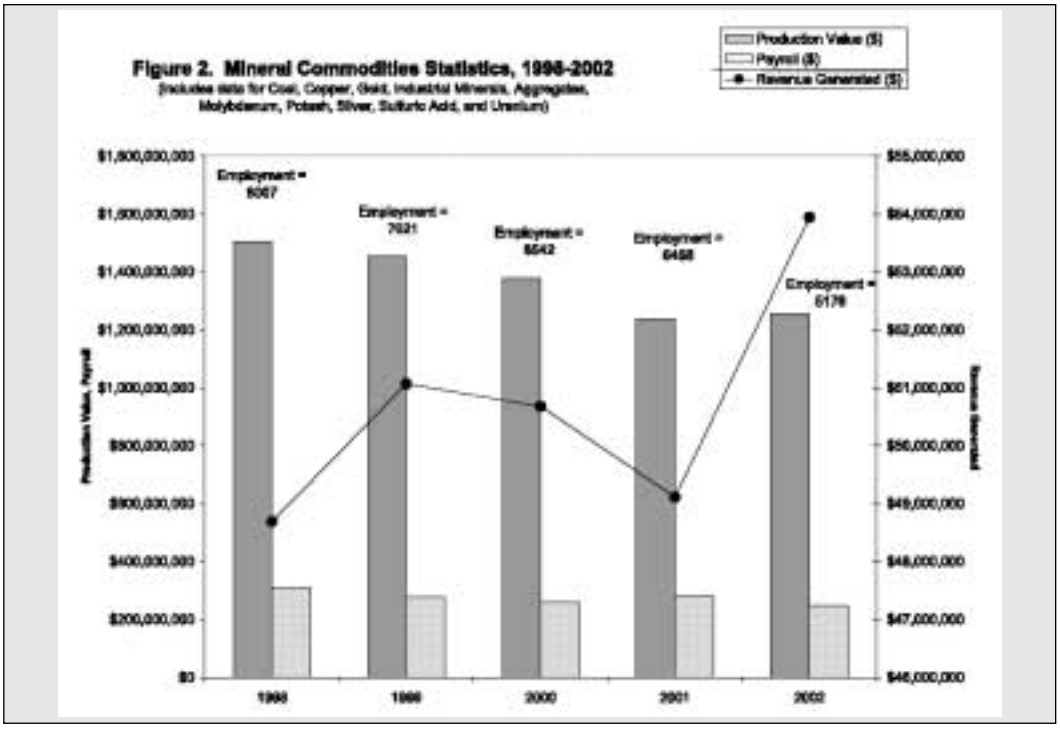
All Data from the Energy, Minerals and Natural Resources Department, Mining and Minerals Division (unless otherwise noted).



state. The potential for electricity generation from wind is enormous in some areas of New Mexico, especially on the eastern plains. New Mexico ranks twelfth in wind electric potential and is among twelve states in the midsection of the country that, together, have 90% of the total commercial wind electric potential in the contiguous United States. New Mexico has the potential to produce many times its own electrical consumption, which puts it in a position to export wind electric power.

Besides the wind our state has great solar potential. Wherever one lives and works in New Mexico, the solar resource has great potential to generate power and heat for our everyday needs.

New Mexico ranks first in the nation in the production of perlite and third in copper and produces over 70 percent of all potash in the U.S. making our state the number one potash producer in the nation. Table 2 provides summary information on mineral commodities produced in the state in 2002. Figure 1 is developed from Table 2 and shows the importance of different mineral commodities to the state and their relative importance to each other. Figure 2 provides total yearly production value, employment, payroll and revenue generated for mineral commodities listed in Table 2 over the previous years. With few exceptions all totals have been decreasing. The upturn in revenue generated to the state is associated with accounting changes according to the Minerals Management Service and is not thought to represent an actual increase. While attributes for individual commodities may have risen over the interval shown, when added together the trend has been down over the last several years.



EXTRACTIVE ENERGY RESOURCES

OIL AND GAS

Through Boom Times and Bust, Oil and Gas is a Fundamental Part of New Mexico, its People and its History

OVERVIEW AND PERSPECTIVE

For more than 70 years, oil and gas has played an important part in shaping New Mexico's economy and has been an industry on which thousands of New Mexicans have built their lives and supported their families. In the 1930s, 1940s and 1950s, the substantial income stream gushing from the oil fields of New Mexico filled state coffers, providing more than 80 percent of the total revenue. Even into the 1980s, over 18,000 people were employed in related jobs and their combined income injected an additional $600 million per year into the communities of Hobbs, Artesia, Roswell, Carlsbad and Farmington along with numerous smaller communities such as Eunice, Jal, Aztec and even Loco Hills. The stability helped keep New Mexico an attractive state for businesses and families to locate.

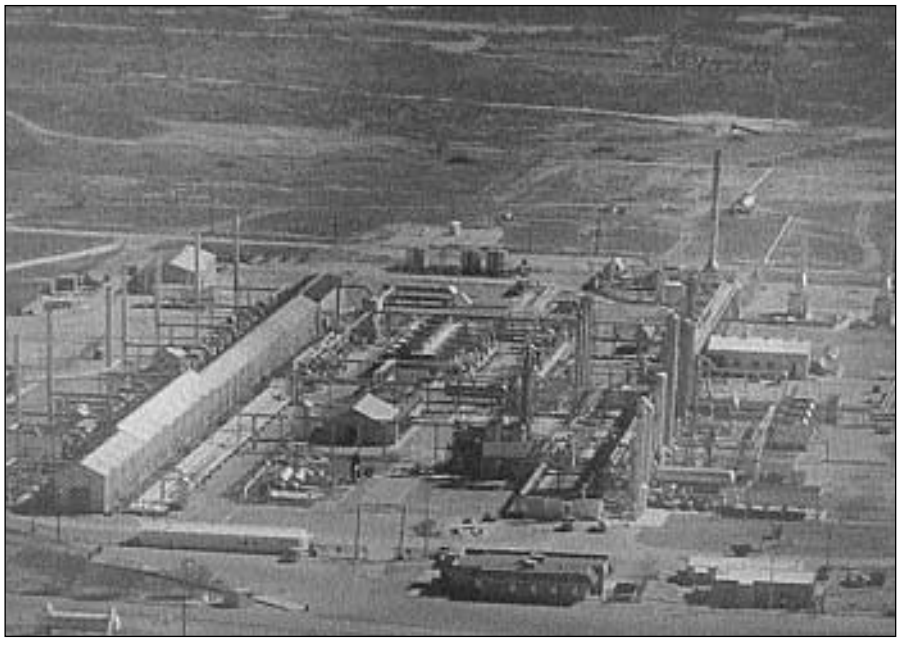
The presence of oil company offices in these communities has been invaluable. Many oil and gas companies have endeavored to partner with the communities to improve the local quality of life. These corporate good neighbors have assisted with dozens of city parks and baseball, softball and soccer fields as well as museums, junior college and other school facilities, town gazeboes, historic walkways and other points of interest. Oil and gas – the sights, the sounds and the people – they're as New Mexican as green chiles and adobe.

In recent years, it has become apparent that the aggressive growth of industry also had some negative impacts on the environment. This impact is certainly not exclusive to the oil and gas industry, but applies generally to industry as a whole. Few would argue that the industrial engine that has fueled the building of our nation and the states is a bad thing. It is our industrial might that has afforded us the American way of life. It was our lack of foresight in the early days of this industrial activity that created some of the issues we deal with today. For the last decade, and particularly the last five years, oil and gas operators have stepped up to meet the challenge. Through cooperation and partnership with the Oil Conservation Division (OCD) and other regulatory agencies, the industry is cleaning up much of the impact of previous generations of less environmentally sensitive exploration and production techniques. Plugging old wells and remediating old facilities like tank batteries and pits are just one aspect of more carefully approaching our stewardship of New Mexico's precious land and water. OCD will continue to propose and support legislation and regulation designed to continue to make New Mexico an attractive and affordable state for oil and gas business, while protecting the state's natural resources and environment.

NEW MEXICO OIL & GAS FACTS

Oil and gas revenues, in the form of severance taxes and public land royalties, have bolstered New Mexico's General Fund since the 1930's. Gross revenues have contributed from a high of 87% of the fund during boom times to approximately 20% in recent years.

New Mexico is 2nd in natural gas production and 3rd (dropping one



The Warren Gas plant in Monument, New Mexico. Circa 1975.

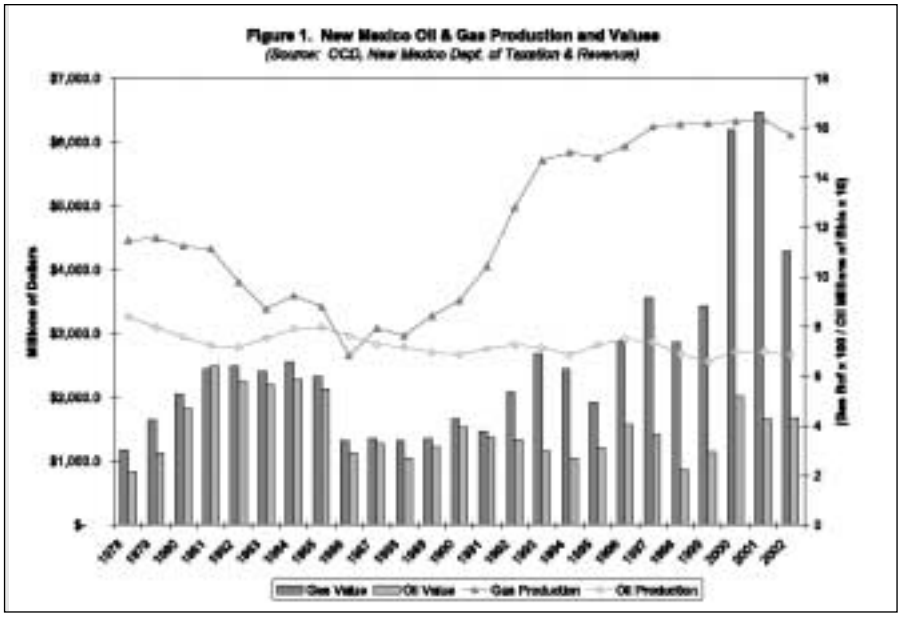


Table 1. New Mexico Gas Production, By Gas Type (1000s cubic feet or MCF)*

	SE Casinghead	SE Dry Gas	NW Casinghead	NW Dry Gas	Total Natural Gas (Includes NE)*	Coalseam Gas (Included in Total)
1998	217,200,294	313,122,852	17,824,395	1,084,033,090	1,831,980,431	608,404,130
1999	203,422,886	324,603,969	16,987,917	1,122,045,553	1,867,082,865	610,387,003
2000	208,084,546	348,240,442	16,399,578	1,106,818,008	1,878,854,029	584,166,484
2001	209,176,136	389,291,017	15,367,620	1,084,340,479	1,883,560,327	539,369,916
2002	204,414,772	378,493,342	14,688,453	1,016,048,229	1,835,950,974	497,269,831

* Totals include gas produced in Northeast New Mexico, which is not presented in a separate column.

Table 2. New Mexico Oil Production, By Oil Type (Barrels)**

	SE Crude	SE Condensate	NW Crude	NW Condensate	Total
1998	61,297,814	4,658,625	1,674,530	1,722,364	69,353,333
1999	57,714,388	4,811,074	1,519,777	1,745,160	65,790,400
2000	59,950,634	5,593,129	1,545,564	1,761,327	68,850,654
2001	59,291,777	6,809,942	1,412,242	1,747,340	69,061,301
2002	57,003,427	7,442,778	1,262,996	1,730,444	67,439,645

** Volumes are adjusted to reflect amended production reports filed with OCD.

Table 3. 2002 Oil Production By County

County	Total Oil	Rank
Lea	37,688,377	1
Eddy	25,713,901	2
San Juan	1,404,781	3
Rio Arriba	1,394,658	4
Chaves	748,095	5
Roosevelt	294,922	6
Sandoval	194,555	7
McKinley	89,446	8
Total	67,439,645	

Table 4. 2002 Gas Production By County

County	Total Gas	Rank
San Juan	638,193,409	1
Rio Arriba	391,256,811	2
Eddy	321,179,298	3
Lea	229,095,196	4
Chaves	31,662,632	5
Colfax	13,206,178	6
Roosevelt	2,881,888	7
Sandoval	1,428,627	8
McKinley	53,835	9
Total	1,835,950,974	

place this year to Wyoming's boom in natural gas exploration and production) in proven gas reserves of all producing states and the Gulf Coast region. A portion of the gas is coalbed methane, in which New Mexico is 1st in production and reserves.

New Mexico also enjoys a ranking of 5th in crude oil production and 4th in proven oil reserves. Having lost it to Oklahoma in 2001 by a mere 500,000 barrels, New Mexico reclaimed the 5th place in oil production in 2002 by out producing Oklahoma by over 9 million barrels!

New Mexico is a leader nationally in both production and reserves of carbon dioxide (CO_2).

Oil and gas operators have boosted and prolonged production from New Mexico oil fields utilizing injection wells for enhanced recovery of reserves.

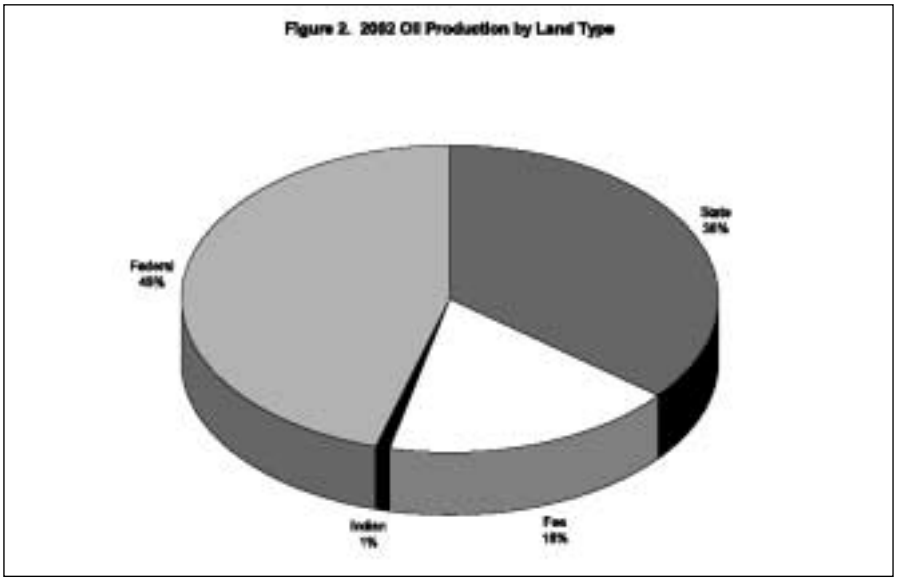
Active wells in New Mexico number 21,771 oil producing wells, 23,261 gas producing wells, 456 CO_2 wells, 4,097 enhanced recovery injection wells and 597 salt water disposal wells. Additionally, there are over 4,500 inactive, non-plugged oil and gas wells that could potentially be returned to production.

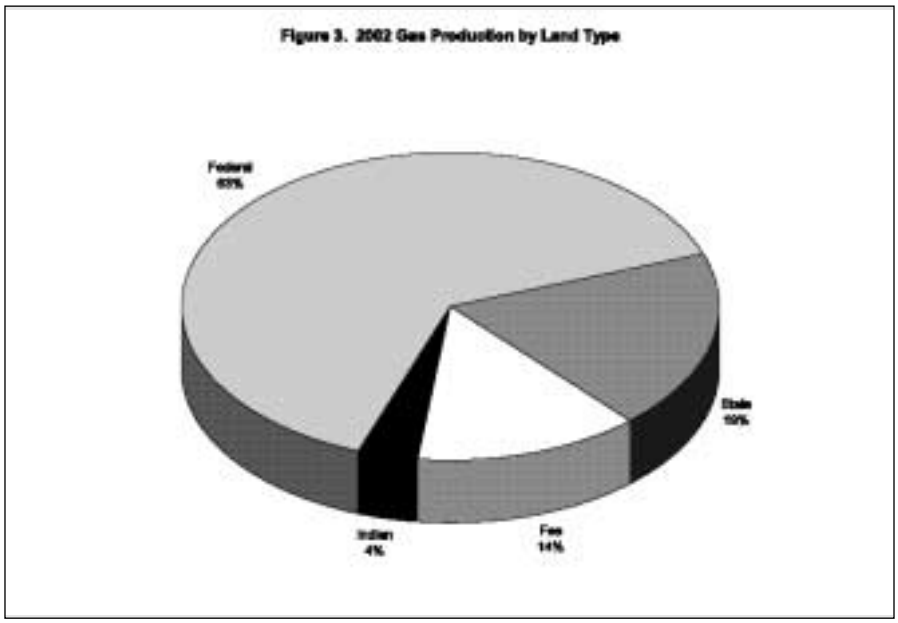
At the end of 2002, New Mexico had over 700 oil and gas industry-related companies operating in the state. Along with companies that specialize in servicing oil and gas operations, and government regulatory personnel, the industry employs approximately 9,300 people statewide.

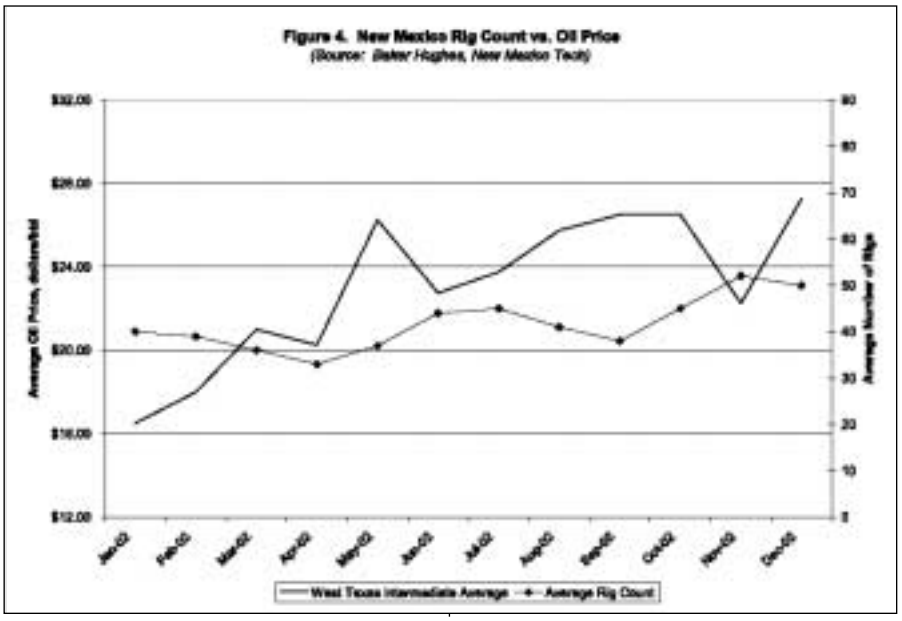
PRODUCTION AND PRODUCTION VALUE

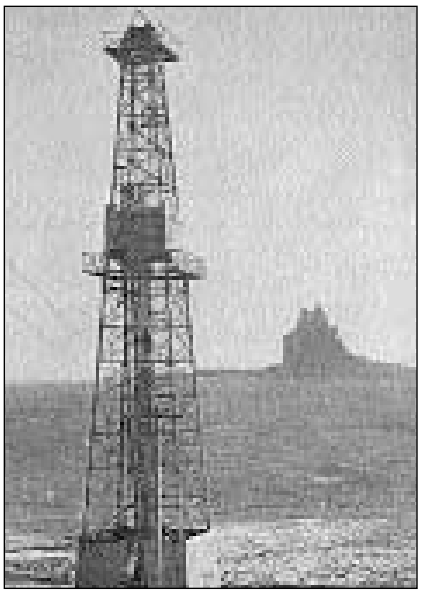
As in the past, most of today's oil production occurs in the New Mexico portion of the Permian Basin in southeast New Mexico and most of the natural gas production occurs in the New Mexico portion of the San Juan Basin in northwest New Mexico. The New Mexico Oil Conservation Division maintains District Offices in Hobbs, Artesia and Aztec to regulate the oil and gas producers in those areas.

After a stable and even active year in 2001, oil and natural gas drilling decreased remarkably in 2002. Activity is very dependent on oil and gas prices. Oil pricing improved in 2002 but natural gas prices fell and rig activity appeared to stagnate. Oil prices ended 2001 at just over $15.00 per barrel, yet 2002 saw oil prices improving





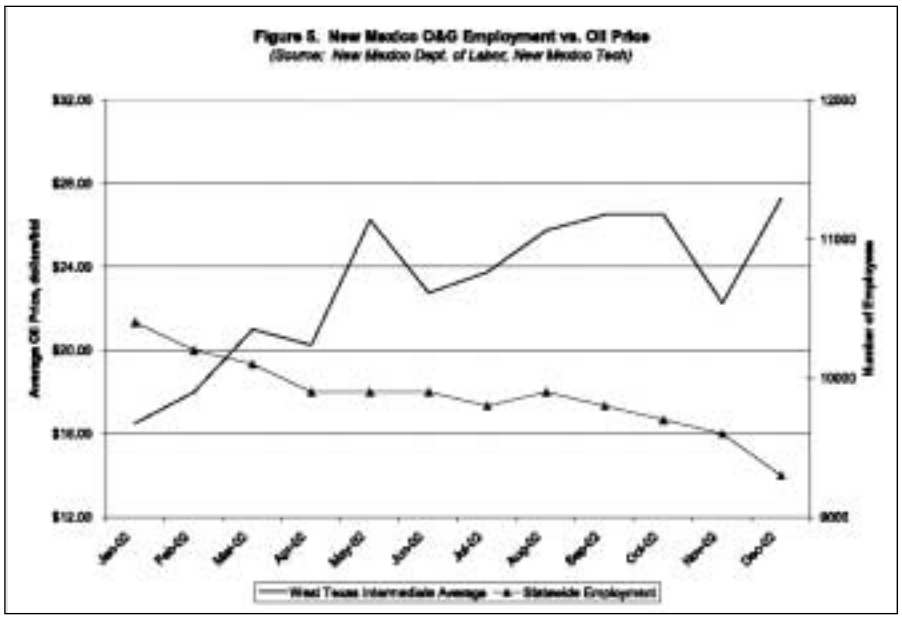


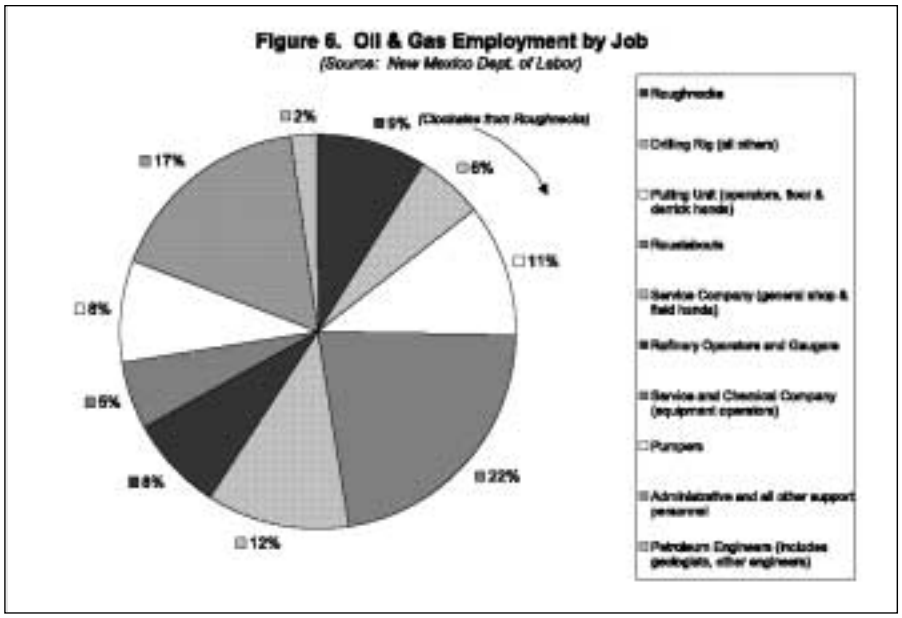


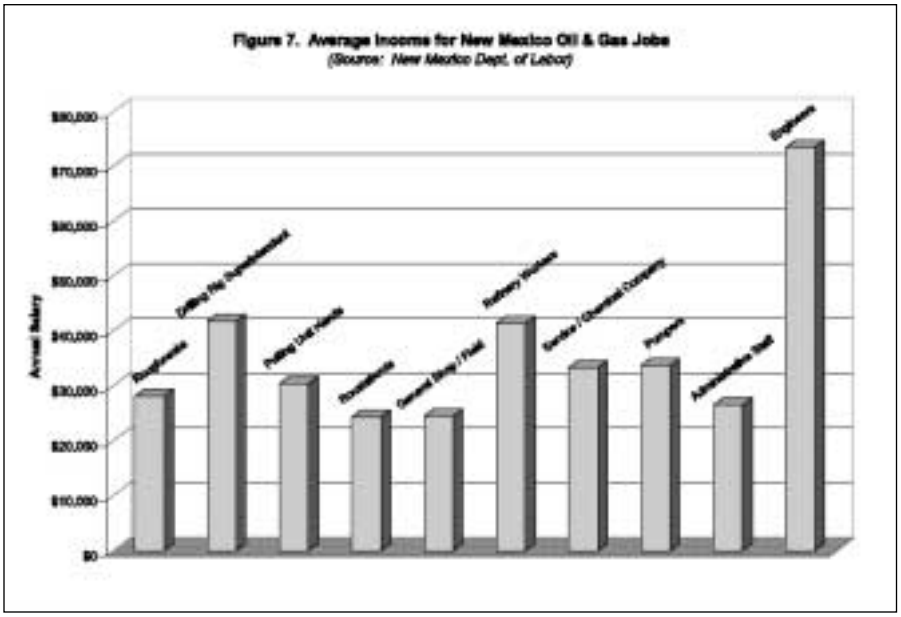
Another rig in the Shiprock area. Date unknown but probably in the late 1930s or the 40s.

across the year, with its best posting in December at almost $28.00 per barrel, well above January's start of $16.00. (Prices reflect the West Texas Intermediate Crude benchmark.) After 'all-time highs' experienced in 2000, natural gas prices dropped and stabilized at a near normal price of $2.52 per MMBtu (Million British Thermal Units) at Henry Hub in the last quarter of 2001. Since 1989 the Henry Hub has been a major collection point for pipelines in the U.S. and has been used for benchmark pricing for many natural gas markets. This trend continued into 2002 until the last quarter when prices closed in December 2002 at a few cents over $4.00 per MMBtu.

Total New Mexico crude oil production (including condensate) in 2002 was 67.4 million barrels. New Mexico natural gas production in 2002 was 1,625 billion cubic feet (BCF) (see Table 1). New Mexico oil and gas operators consistently received better pricing for their product than the posted benchmarks for both oil and natural gas (see Figures 9 and 10).







ACTIVITY AND EMPLOYMENT

In spite of good product prices for the whole year, New Mexico's oil and gas activity slowed in 2002. Rig count started low but saw a marginal and steady increase throughout the year. Beginning with 40 rigs, the year ended with 50 rigs running with a low of 33 in April. On average, only half the number of rigs were running compared to 2001.

As a result, new well completions also declined compared to the previous year, decreasing substantially from 1553 new completions in 2001 to 1219 for 2002. The year 2002 ended with a total of 343 new oil well completions, 850 new gas well completions and 26 new completions of other types.

Unfortunately, even as oil and gas prices were on the rise, more than 1,000 oil and gas workers lost their jobs in 2002. This decline in employment may have been a delayed reaction to corporate restructuring due in part to depressed oil and gas prices in 2001. The general trend in employment numbers for the last 15 years, give us hope that many of these jobs, and even some additional ones, may return in the next two to three years. Still, employment numbers remain higher than the last 10-year average.

As wells play out and become uneconomical to operate and produce, they must be plugged. This is done primarily to protect underground sources of drinking water by preventing the migration of oil, gas and saltwater from the producing zones to the more shallow fresh water zones. Cement is pumped down the wellbore to seal off hydrocarbon zones. Occasionally, wells are left "orphaned" by a company that becomes insolvent and plugging bond funds are not sufficient to plug the wells that are left behind. In this

case, it becomes the responsibility of the state to have the wells properly plugged. During the late 1990s, the OCD was particularly active in this regard, posting higher than average plugging numbers for a typical year. Also, new operators will frequently lease an old producing field and re-enter plugged wells. Often, new production technologies make putting an old well back on production economically feasible.

Beginning in May 2000 and continuing through 2002, OCD staff commenced the "Inactive Well Project." This project involved reconciliation of agency data to determine wells that had no production reported for one year or longer. Of over 8,300 wells that were identified, OCD staff made a diligent and concerted effort to work with the responsible oil and gas operators and has brought the inventory down to less than 1,900. Large numbers of wells were returned to compliance and many defunct wells were properly plugged and abandoned. Additionally, many old and mechanically unsound oil and gas facilities have been repaired or dismantled and the immediate area cleaned-up and remediated where necessary.

TAXATION AND REVENUE

The oil and gas industry continued to be a major contributor to the state coffers of New Mexico in the fiscal year ended June 30, 2002. The state benefited as follows:

General Fund Contributions	$496,718,000
Royalties from State Lands	$197,741,000
Severance Tax Proceeds	$200,740,000
Earnings on Permanent Funds	$389,913,000
Total Contribution	$1,284,112,000

State revenues from oil and gas production accounted for approximately 21% of general fund revenues for the fiscal year 2002. Table 7

Table 5. Wells DRILLED and COMPLETED by Year by Well Type by District*

	District I			District II			District III			District IV			
	Gas	Oil	Oth	Gas	Oil	Oth	Gas	Oil	Oth	Gas	Oil	Oth	Total
1998	89	186	13	101	199	12	315	10	1			14	927
1999	67	137	4	95	140	6	368	11	1	22			881
2000	87	321	16	231	279	11	627	3	1	60		1	1,535
2001	90	287	15	300	280	7	538	11	1	84			1,393
2002	50	176	6	180	162	2	623	6	6	97		10	1,219

* First reported completion per well.

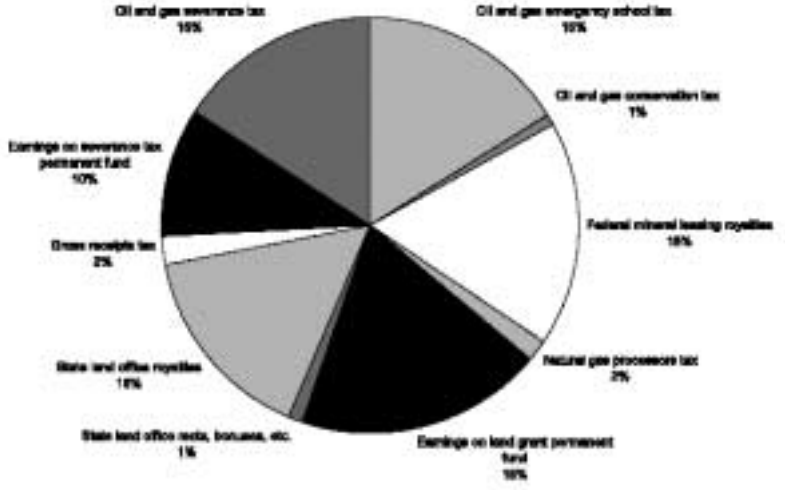
Table 6. Wells PLUGGED by Year by Well Type by District

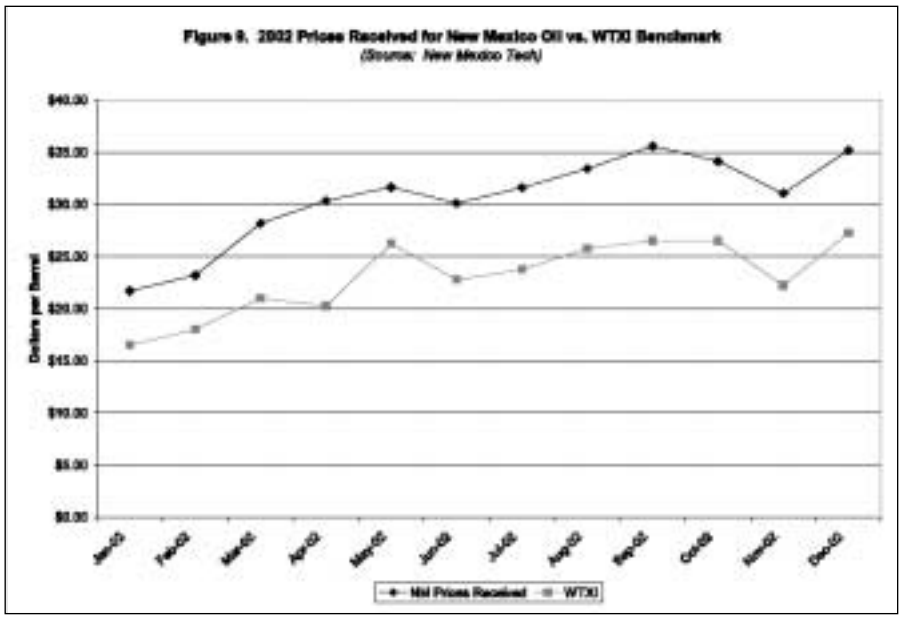
	District I			District II			District III			District IV			
	Gas	Oil	Oth	Gas	Oil	Oth	Gas	Oil	Oth	Gas	Oil	Oth	Total
1998	36	163	32	31	84	3	118	73	36			34	576
1999	20	81	16	31	42	6	121	61	10	2			376
2000	21	161	77	43	90	19	119	60	8	2		42	632
2001	36	188	73	55	150	31	148	68	27	3			781
2002	38	218	67	82	167	18	198	69	31	4			886

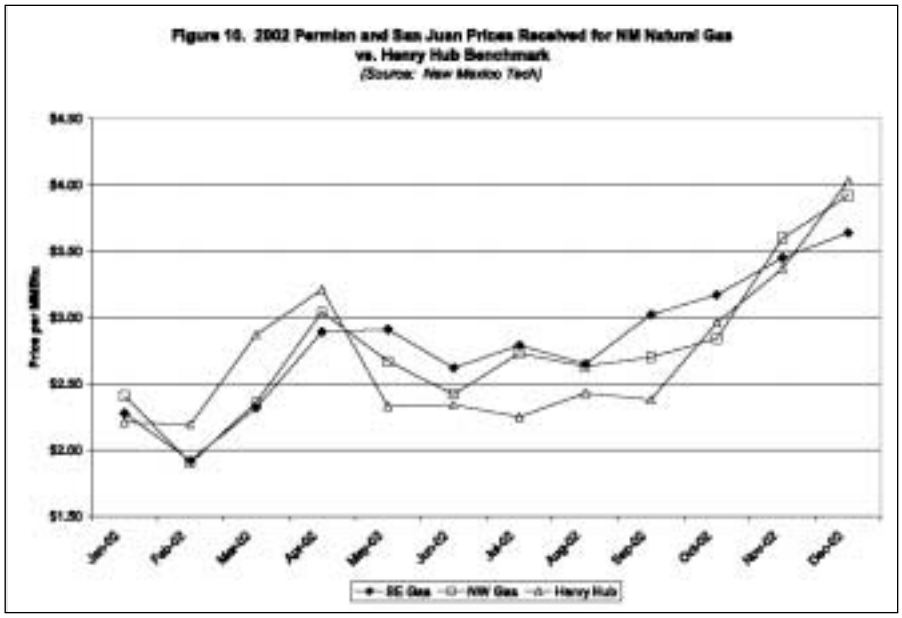
Table 7. State Revenues from Oil and Gas Production
Amounts in Millions of Dollars
(Source: New Mexico Dept. of Taxation & Revenue)

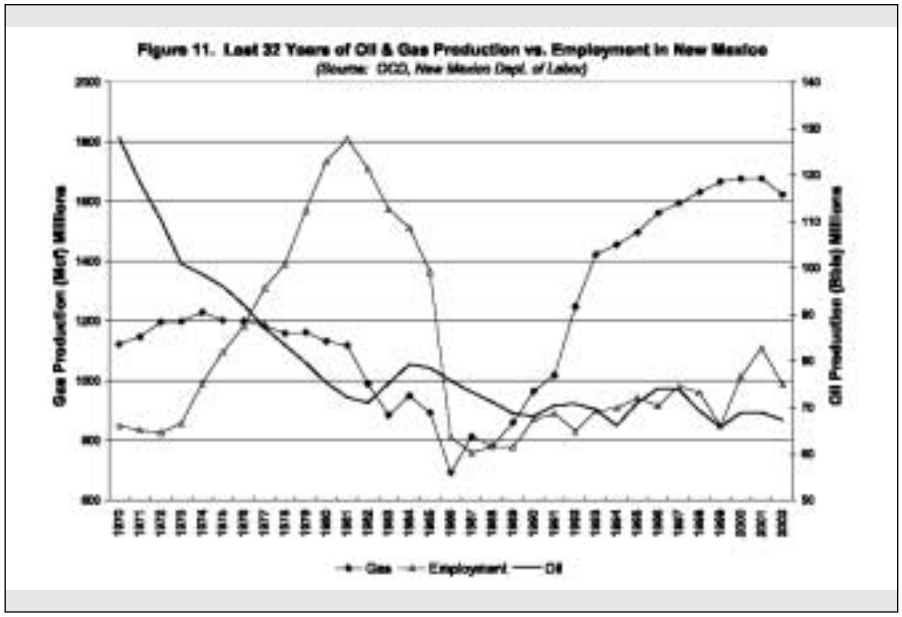
	FY98	FY99	FY00	FY01	FY02
Oil and gas emergency school tax	$ 154	$ 106	$ 169	$ 329	$ 205.1
Oil and gas conservation tax	8	8	8	18.8	10.3
Natural gas processors tax	13	11	12	12.1	20.3
Federal mineral leasing rents and royalties	156	131	187	369	221.3
State land office rents, bonuses, etc.	8	7	11	24	13.5
Earnings on land grant permanent fund	196	208	207	228.2	242.6
Earnings on severance tax permanent fund	109	111	113	115.7	127.3
Gross receipts tax	15	14	24	32.4	25.9
Subtotal-Revenue to state general fund	$ 654	$ 590	$ 742	$ 1119	$ 866
Severance tax bonding fund:					
Oil and gas severance tax	$ 153	$ 118	$ 185	$ 315.8	$ 200.7
Permanent fund:					
State land office royalties	$ 127	$ 102	$ 151	$ 265.5	$ 197.7
Grand Total All Funds	$ 944	$ 798	$ 1,068	$ 1,720	$ 1,264

Figure 8. FY 2002 State Revenue from Oil and Gas Sales
(Source: New Mexico Dept. of Taxation and Revenue)









shows the breakdown of types of taxes and amounts for fiscal years 1998 through 2002.

PRICES

The price of crude oil (WTXI) did have a nice, steady increase throughout the year. Starting at $16.50 per barrel in January, the price remained around $25.00 per barrel for most of the year, closing in December at $27.25 per barrel. The natural gas markets also enjoyed a steady increase. Starting the year at $2.52 per MMBtu, the price gradually increased almost monthly and closed the year at $4.03 per MMBtu (see Figures 9 and 10 for oil and gas prices).

MARGINAL (STRIPPER) WELLS

A marginal well is defined as a gas well that produces less than 60 thousand cubic feet (Mcf) of natural gas per day, or an oil well that produces less than 10 barrels of oil per day. As of December 31, 2002, there were 9,053 marginal gas wells in New Mexico that produced 76,081,278 Mcf of gas and 13,325 marginal oil wells that produced 13,001,435 barrels of oil. This production amounted to 4.6% of total New Mexico natural gas production and 19.3% of total New Mexico oil production. As can be seen from these figures, marginal well production is very important to the State.

CARBON DIOXIDE

New Mexico continued to be a national leader in both reserves and production of carbon dioxide (CO_2) during 2002. Carbon dioxide, a heavy, colorless and odorless gas at normal pressure and temperature, has been produced commercially in New Mexico since the early 1930's. Historically it has enjoyed a wide variety of uses, but not until the discovery of CO_2 flooding as an enhanced oil recovery technique did demand for CO_2 increase

significantly from previous levels. This, in turn, stimulated the rapid growth of our state's CO_2 industry.

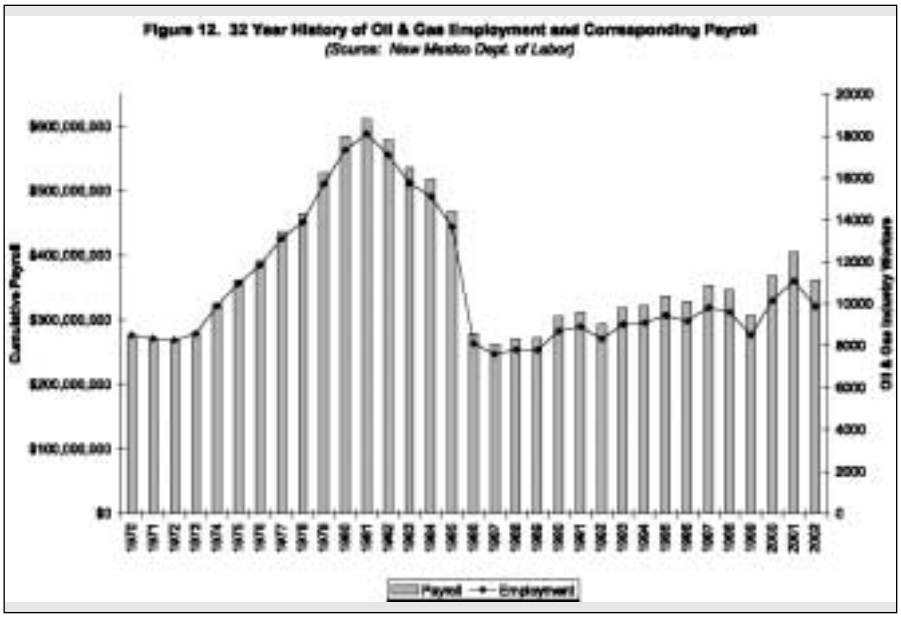
In the northeast quadrant of New Mexico, the industry is developing what is believed to be the largest deposit of CO_2 in the United States. The Bueyeros field, better know as the Bravo Dome, encompasses 1.2 million acres in Harding, Union and Quay Counties. It is estimated to contain over 16 trillion cubic feet of CO_2 reserves. Approximately half of these in-place reserves are considered to be recoverable using currently available technology.

Total 2002 CO_2 production was 100 billion cubic feet valued at nearly $61 million. This represents a 14% decrease in production from 2001, but prices remained strongly above $0.55 per Mcf throughout the year allowing for good revenue for the producers and to the state. Virtually all CO_2 marketed in the state is transported to oilfields in the Permian Basin of Texas and New Mexico for use in enhanced oil recovery projects, where it is injected instead of water and has a "scouring" effect on oil producing formations, thereby moving more oil through the formations towards the producing wells.

COALBED-METHANE

Methane is the primary component of natural gas. Natural gas is the cleanest burning of the fossil fuels. It is used for electrical generation, in heavy industry, and to heat 50% of the homes in the United States. Due to concerns about greenhouse gases and acid rain, many electric generation facilities are being converted from other fossil fuels to natural gas. Natural gas demand is expected to rise 40% to 50% in the next decade.

Coalbed methane (CBM) is methane gas found in coal deposits



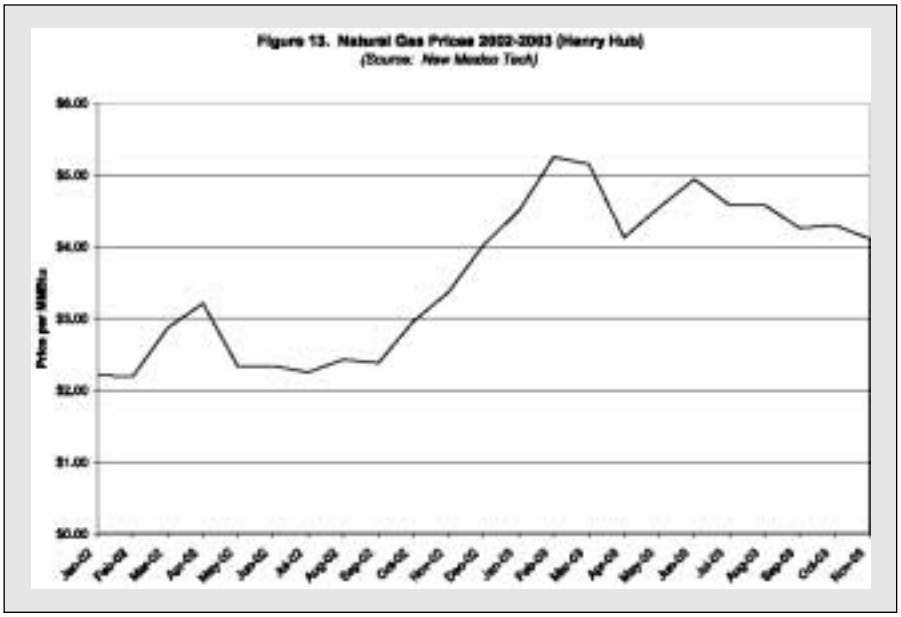


Table 8. Enhanced Recovery Incentive by Year

Year Permitted	Number of Projects	Operator Estimated Project Cost (Millions of Dollars)	Project Life Estimated Additional Recovery (Millions of Barrels)
1992	4	92.4	48.8
1993	11	48.7	26.4
1994	6	26.9	70.9
1995	3	8.4	4.1
1996	5	8.9	7.9
1997	11	419.5	38.1
1998	5	15.8	32.9
1999	2	1.8	0.7
2000	4	12.5	7.4
2001	12	600.2	158.6
2002	5	63.3	22.8

ANNUAL ECONOMIC IMPACT OF ENHANCED RECOVERY INCENTIVE: $4.8 Billion

underground. It exists in the cracks and on the surfaces of the coal deposits. According to the U.S. Geological Survey, coal stores substantially more gas than other types of rock typically found in gas reservoirs. Often a coal seam is saturated with water and methane is held in the coal by the pressure of the water. The water must be pumped out ("produced") before the gas can be extracted. Currently, natural gas from coalbeds is approximately 7% of the total natural gas production in the United States, and nearly one-third of the estimated 184 trillion cubic feet (Tcf) of gas in the Rocky Mountain Region is in coal seams.

According to the United States Geological Survey, the Rocky Mountain Region has extensive coal deposits with significant storage of coalbed methane gas. Untapped resources of coalbed methane exist

A rig worker poses in front of an 83 Mmcf per day blowout in the San Juan Basin. Circa 1923.

in the Powder River Basin of Wyoming and Montana, the Greater Green River Basin of Wyoming, Colorado, and Utah, the Uinta-Piceance Basin of Colorado and Utah, and the Raton and San Juan Basins of Colorado and New Mexico. It is estimated the Rocky Mountain region has about 30-58 trillion cubic feet of recoverable CBM.

The Fruitland Coal formation of the San Juan Basin is the largest CBM producer in the country. CBM production from the New Mexico portion of the San Juan Basin peaked in 1999 at over 610 Bcf. By 2002, the production had dropped to about 487 Bcf as the play matured.

There are two underground rock formations of interest in the Raton Basin: the Vermejo and the Raton. Both are coal-bearing formations lying above the Trinidad Sandstone. The Vermejo is named after the Vermejo Park Ranch area of New Mexico (the area is in OCD District IV). It consists of shale, sandstone, and coal, with the coal representing about 10% of the total. The Raton Formation contains more coal than

OIL INDUSTRY MOURNS ANOTHER LOSS

A founding member of the Independent Petroleum Association of New Mexico (IPANM), Robert L. Bayless, Sr., died on December 6, 2002 in Farmington. Mr. Bayless was well known in the oil and gas industry in New Mexico and he remained active in the business until his death. He was active in other trade organizations including the Independent Petroleum Association of Mountain States (IPAMS) and the Independent Petroleum Association of America (IPAA). In 1997, Bob received the prestigious "Wildcatter of the Year" award given by the IPAMS.

Born February 13, 1928 in Bixby, Oklahoma, Bob married Bernice M. Williams in 1949 and together they raised four children – Cindy, Tucker, Rob and Betsy. Bob held a degree in Business Management from the University of Tulsa. After graduating from college, Bob worked several years in oil and gas industry-related positions in Oklahoma and California.

In 1958, he moved his family to Farmington where he began to pursue his dream of becoming an independent oil and gas producer. Bayless operated primarily as a sole proprietor until 1966, when he joined with the late J. Gregory Merrion to form the partnership Merrion and Bayless in hopes of enhancing their presence in the San Juan Basin of northwestern New Mexico. After 16 years and an amicable separation from Merrion, Bob continued his oil and gas exploration and production operations, gradually expanding into what is today, Robert L. Bayless, Producer LLC with significant holdings in New Mexico and Colorado.

Bob was an active participant in many local community service, educational and medical organizations. As a tribute to his many and varied contributions to his community, Bob was recently inducted as a member of the San Juan College and Farmington Chamber of Commerce "History Makers Hall of Fame." He also recently received one of twelve, "Distinguished New Mexican" awards given by the governor of the State of New Mexico.

Bob was an inspiration to all of his family and friends. Even when dealing with poor health, Bob was always positive, upbeat and supportive. He leaves behind a legacy of love, hard work and charity – a legacy that will long endure.

(Portions excerpted from the IPANM Independent, Nov.-Dec. 2002.)

OTHER SOURCES OF INFORMATION

New Mexico Oil Conservation Division
Santa Fe, NM
http://www.emnrd.state.nm.us

New Mexico State Land Office
Santa Fe, NM
http://www.nmstatelands.org/landoffice/Start.asp

U.S. Department of Energy
Petroleum Recovery Research Center
Energy Information Administration
Washington, DC
http://www.eia.doe.gov

New Mexico Tech
Socorro, NM
http://octane.nmt.edu

New Mexico Department of Finance and Administration
Santa Fe, NM
http://www.state.nm.us/clients/dfa

New Mexico Taxation and Revenue Department
Santa Fe, NM
http://www.state.nm.us/tax/

the Vermejo, but the coal seams are not as concentrated. Both formations are exposed at the surface in some areas and in others lie as far as 4000 feet below ground.

Coalbed methane accounted for 497,260,051 Mcf of the total gas production in New Mexico for 2002. Of this, 10,206,178 Mcf were produced from beneath the Vermejo Park Ranch in Colfax County.

TRENDS, DEVELOPMENTS AND FORECASTS

At press time for this publication the NYMEX price for West Texas Intermediate (WTXI) was $28.00 per barrel. The price for WTXI at the Navajo Refinery was $30.00. Natural gas posted at $4.75 per MMBtu. This is good news for the industry and the State of New Mexico.

New Mexico continues to be very strong in the production and reserves of natural gas. New Mexico remains the number two domestic producer of natural gas but has fallen to third in reserves due to the high pace of natural gas exploration and production in the state of Wyoming. New Mexico produced 1,625 Bcf (billion cubic feet) in 2002 and has proven reserves of 17,414 Bcf.

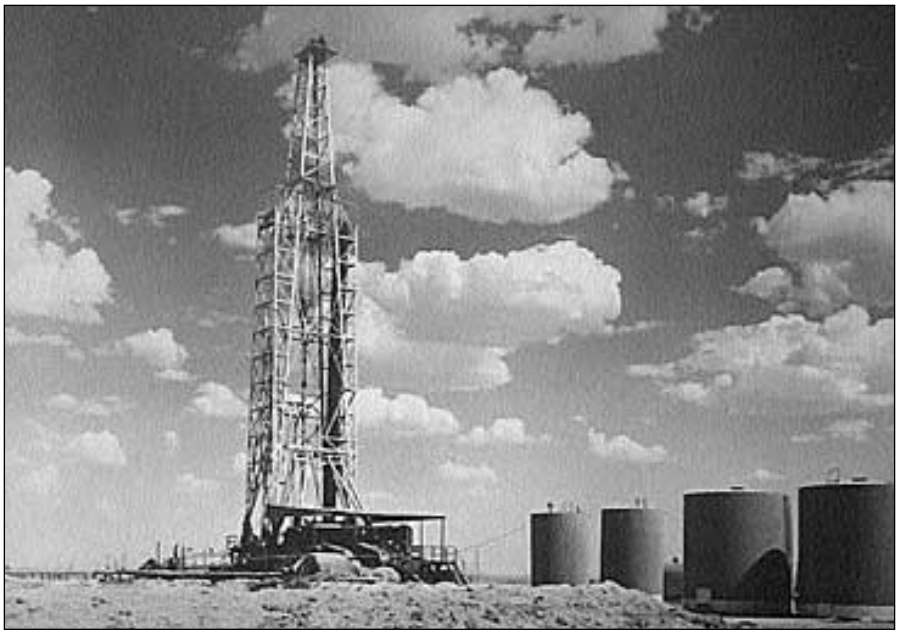
Prices for natural gas rose dramatically in late 2002 and have held steady around $4.25 per MMBtu for all of 2003. Prices are expected to remain at these levels through next year. Potential spikes are always a possibility considering weather and storage.

Natural gas consumption is expected to increase more than 40 percent by 2015, fueled by continued strong industrial demand and the popularity of gas among new-home buyers and commercial customers, coupled with a significant load increase from new gas-fired electricity generation facilities, according to an American Gas Association forecast released this summer. That projected growth, which is not unlike the growth experienced between 1986 and 1997, will expand the gas share of the U.S. energy market to more than 28 percent.

Assuming normal weather plus lower oil prices yields a Henry Hub price of $4.10 (versus $5.90 last year) for the winter of 2003. Henry Hub prices with last year's weather would be about $5.30 per MMBtu average. Currently, Henry Hub prices for 2010 are trading at $4.50 to $4.75 per MMBtu. Henry Hub prices are projected to range between $4.00 and $6.00 per MMBtu through 2010.

INCENTIVES

The year 2002 was the 11th year of the Enhanced Oil Recovery (EOR) Incentive and reflected an average year of activity. The year saw the approval and implementation of a 5 new projects valued at over $63 million and estimated to recover nearly 23 million additional barrels of oil. Calculated at an average 20-year project life, the projects approved to date have the potential to inject nearly $5 billion per year into New Mexico's economy.



A drilling rig in southeastern New Mexico. Circa 1969.

COAL

Coal is typically classified into four general categories that reflect increasing heat and pressure, including lignite, subbituminous, bituminous and anthracite. The carbon content of coal supplies most of its heating value, but other factors also influence the amount of energy it contains per unit of weight. The amount of energy in coal is expressed in British thermal units (BTU) per pound. A BTU is the amount of heat required to raise the temperature of one pound of water one degree Fahrenheit. Information related to coal types is provided in Table 9.

Table 9. Characteristics of Coal

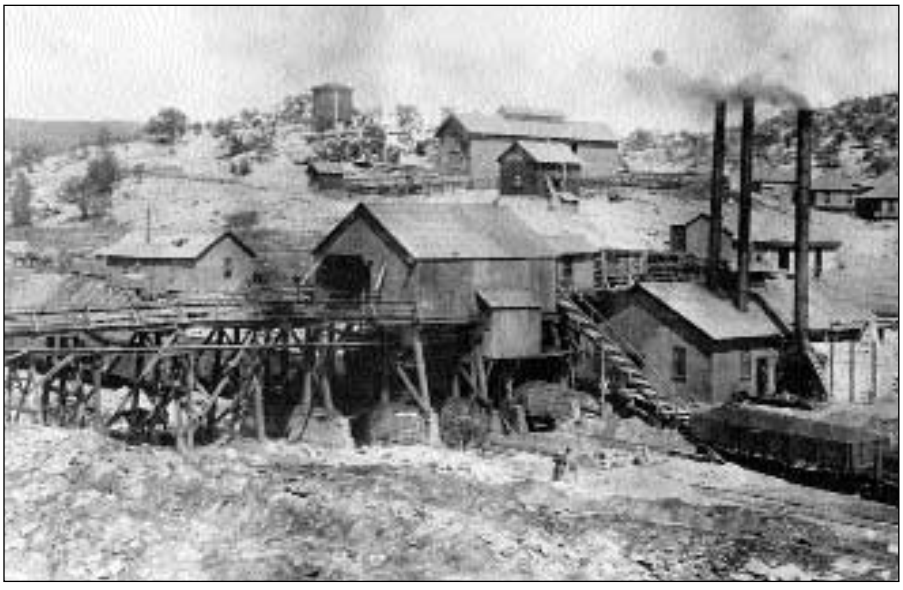
Coal type	Carbon content (%)	Heat value in BTU/lb.	Use	Where found
Anthracite	86 to 98	over 15,000	home heating	NE Pennsylvania
luminous	45 to 86	10,500 to 15,500	electric power generation; coke production	Eastern and mid-continent coal fields
bituminous	35 to 45	8,300 to 13,000	electric power generation	Western states, Alaska and New Mexico
Lignite	25 to 35	4,000 to 8,300	electric power generation	Primarily Texas, but also Montana, North Dakota, and some Gulf Coast states

U.S. COAL

U.S. coal production declined in 2002 by 33.9 million short tons to end the year at 1,094 million short tons, down 3.0 percent from the 2001 level. Total coal consumption rose in 2002, with the electric power sector increasing consumption by nearly 2 percent.

The sluggish economy, coupled with the warm winter experienced over most of the country in 2002, helped to hold down demand for coal during the first half of the year. However, the warmer-than-normal summer over many parts of the nation, helped to increase coal consumption for electric power generation for the year.

Although 2002 was not a banner year for the coal industry, there were many positive elements. The outlook for U.S. coal in 2003 is likely to be better than 2002, with increasing economic growth, rising consumer stocks, and normal weather patterns pushing production levels upward.



Tipple of Weaver Coal Mine at Gallup, NM, ca. 1910. (Source: Bureau of Geology and Mineral Resources) Historic Photo Archive Collection.

(Source: DOE's Energy Information Administration: U.S. Coal Supply and Demand – 2002 Review; and the Annual Energy Outlook)

NEW MEXICO COAL

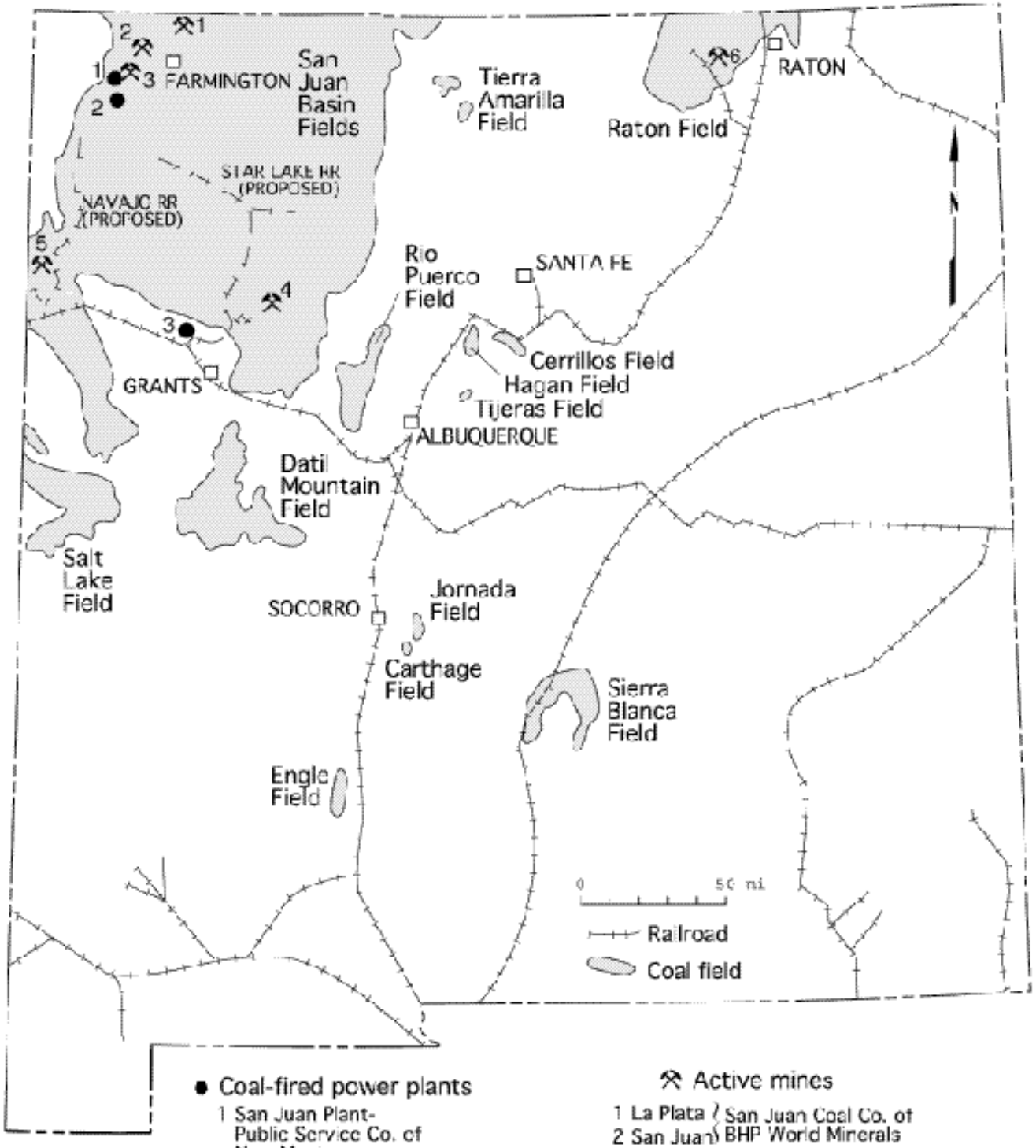
Six surface coal mines were active and included BHP's Navajo, San Juan and La Plata mines, Pittsburg & Midway's (P&M) Ancho and McKinley North/South mines, and Peabody Natural Resources' Lee Ranch mine. In addition to surface operations the San Juan Mine started underground operations in 2001.

In December 2001 P&M's Ancho mine announced that because surface reserves are becoming more expensive and difficult to develop, it finished contracts by the 3rd quarter of 2002 and laid off approximately 150 workers. A small work force will remain through 2004 to complete final reclamation activities at the Ancho and other York Canyon mines.

According to a press release dated August 4, 2003 Salt River Project (SRP) will not develop the Fence Lake Coal Mine in western New Mexico. SRP's Board of Directors voted to approve entering into a letter of intent for the long-term supply of coal from the Powder River

Figure 14. Coal Fields, Mines and Generating Stations in New Mexico

Modified from New Mexico Energy, Minerals and Natural Resources Department, 1998



Basin in Wyoming to be used at the Coronado Generating Station. Fence Lake, located approximately 43 miles east of the generating station in St. Johns, AZ was to have been the coal supply for the power plant beginning in 2006. Coal prices on the open market made it favorable for SRP to purchase coal rather than operate its own mine. SRP is the largest provider of electricity in the greater Phoenix metropolitan area, serving about 800,000 customers.

Lee Ranch Coal Company in 2001 applied for a new mine in McKinley County named El Segundo. The application continues to be under early stages of administrative review. If approved the permit area would comprise 15,540 acres with mining commencing by 2005. Total production for the mine is estimated at 102 million tons over a 30 year period.

A map of coal mines and major coalfields in New Mexico can be found in Figure 14. The map indicates the majority of the state's coal is located in two major areas: the San Juan Basin in the northwest located primarily in San Juan, McKinley, and Cibola counties; and the Raton Basin located in Colfax County. Most of the remaining coalfields in the state are small and dispersed and are located generally in the central part of the state. New Mexico coal fuels electrical generating plants primarily in New Mexico and Arizona.

State-permitted active mines and mines under reclamation, as well as the mine name and approximate location, can be found in Table 10. Coal mines not listed on the table e.g., BHP World Minerals' Navajo mine, and P & M's McKinley North mine are under federal jurisdiction.

Table 10. Coal Mines Permitted by the State of New Mexico, Active and Under Reclamation in 2002
(Source: MMD – Coal Mine Reclamation Program)

Mining Company	Mine	Approximate Location	Total Acres Disturbed as of end of 2002	Total Acres Reseeded as of end of 2002
Pittsburg & Midway Coal Company(York Canyon Complex)	Ancho Mine	West of Raton, NM	2,332	1368
	Gachupin-Bradlett	New unit of Ancho Mine	Approved 10/99	
Pittsburg & Midway Coal Company(York Canyon Complex)	York Canyon Underground Mine (new surface mining approved 9/99)	West of Raton, NM	650	210
Pittsburg & Midway Coal Company	McKinley South		4,636	3002
San Juan Coal Company	San Juan Mine	North of Waterflow, NM	5,140	2568
	San Juan Underground	New unit of San Juan Mine	Approved 10/99	
San Juan Coal Company	La Plata Mine	North of La Plata, NM	1,936	85
Lee Ranch Coal Company	Lee Ranch Mine	NW of San Mateo, NM	5,245	3026
Mines Under Reclamation				
Carbon Coal Company	Mentmore	West of Gallup, NM	1,746	1,557
Carbon Coal Company	Carbon No. 2	West of Gallup, NM	308	308
Pittsburg & Midway Coal Company (York Canyon Complex)	York Canyon Surface Mine	West of Raton, NM	1,174	1,003
Pittsburg & Midway Coal Company (York Canyon Complex)	Cimarron Underground Mine	West of Raton, NM	54	5
San Juan Coal Company	Black Diamond	NW of La Plata, NM	23	22
Salt River Project	Fence Lake No. 1	NW of Quemado, NM	110	110
Yampa Mining Company	De-Na-Zin	South of Farmington, NM	148	172
Yampa Mining Company	Gateway	South of Farmington, NM	144	144

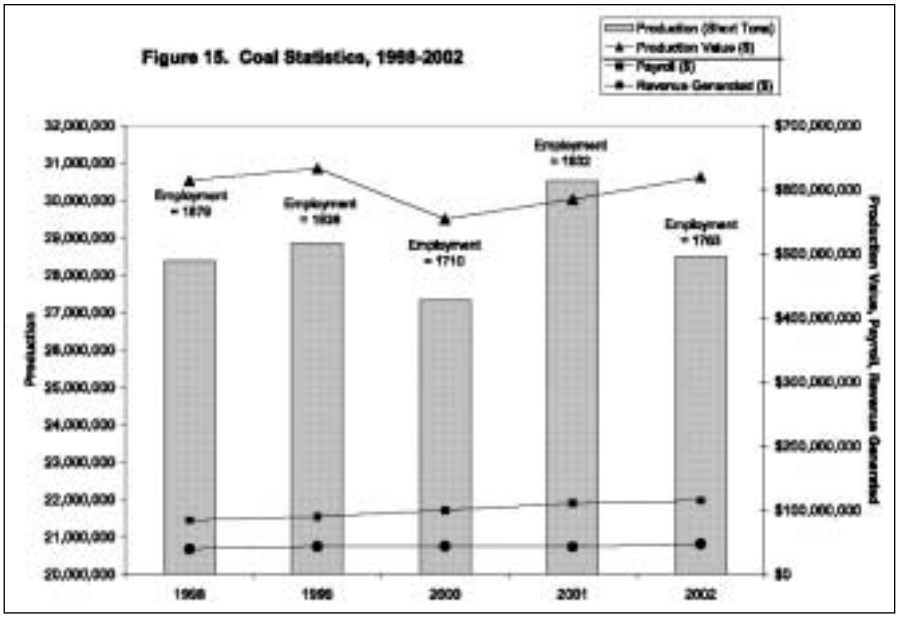


Table 11. New Mexico Coal Production by Mine (in Short Tons), 1998 - 2002

COUNTY	MINE	1998	1999	2000	2001	2002
Colfax	York Canyon Complex	1,486,400	1,166,378	1,137,181	1,200,000	677,236
McKinley	McKinley	6,923,700	7,183,385	5,247,823	6,915,848	5,792,041
McKinley	Lee Ranch	4,790,814	4,929,848	5,080,835	6,041,279	6,388,726
San Juan	Navajo	8,417,120	9,374,060	8,489,100	8,020,447	8,099,000
San Juan	San Juan	2,884,262	1,906,228	2,625,419	3,530,418	3,521,501
San Juan	La Plata	3,880,268	4,285,457	4,757,674	4,817,409	4,023,725
TOTAL		28,382,364	28,845,336	27,337,832	30,525,401	28,502,231

Note: Production for the York Canyon Complex are tons remaining after washing.
Data are from EMNRD, Mining and Minerals Division.

Table 12. Surface-minable Reserves in New Mexico by Field (in millions of short tons)

	10:1 Stripping Ratio			Depth 0-150 ft			Depth 150-250 ft			Totals
Field	Measured	Indicated	Total	Measured	Indicated	Total	Measured	Indicated	Total	0-250 ft
Fruitland	340.58	72.91	413.49	366.30	187.90	554.20	103.80	61.00	164.80	719.00
Barker Creek	7.02	33.84	40.86	11.23	37.49	48.72	14.66	20.98	35.64	84.36
Hogback	5.00	39.99	44.99	56.30	423.10	479.40	18.40	125.00	143.40	622.80
Newcomb	4.42	32.57	36.99	7.09	53.92	61.01	4.59	40.93	45.52	106.53
Chaco Canyon	0.00	0.00	0.00	1.25	8.81	10.06	4.03	31.34	35.37	45.43
Chacra Mesa	2.57	8.50	11.07	14.84	61.12	75.96	17.02	103.96	120.98	196.94
San Mateo	10.76	35.39	46.15	72.11	172.68	244.79	67.10	198.05	265.15	529.94
Standing Rock	22.35	117.93	140.28	58.00	257.60	315.60	35.10	145.90	181.00	496.60
La Ventana	14.50	39.58	54.08	33.94	117.21	151.15	13.27	32.99	46.26	197.41
Monero	3.25	12.65	15.90	4.11	14.37	18.48	0.85	1.48	2.33	20.81
Crownpoint	50.12	197.13	247.25	130.10	527.00	657.10	52.68	184.33	237.01	894.11
Gallup	77.47	110.92	188.39	235.97	352.04	588.01	75.04	217.94	292.98	880.99
South Mt. Taylor	0.00	0.00	0.00	1.60	4.40	6.00	1.90	9.50	11.40	17.40
Zuni	3.15	6.72	9.87	9.57	31.94	41.51	4.84	20.75	25.39	66.90
Navajo	119.85	402.81	522.66	256.30	932.20	1188.50	94.40	295.90	390.30	1578.80
Bisti	187.60	324.86	492.86	268.90	354.60	643.50	163.00	350.40	513.40	1156.90
Star Lake	195.05	260.55	455.60	327.00	383.70	710.70	147.60	149.50	297.10	1007.80
Rio Puerco	1.20	9.40	10.60	3.34	21.42	24.76	0.00	0.00	0.00	24.76
Salt Lake	21.09	88.41	109.50	66.81	212.87	279.68	22.71	69.56	82.27	361.95
Cerrillos	0.00	0.00	0.00	4.20	17.30	21.50			0.00	21.50
Sierra Blanca	0.00	0.00	0.00			0.00	6.00	35.74	41.74	41.74
Engle	0.00	0.00	0.00			0.00	1.40	7.30	8.70	8.70
Datil Mtns.	1.00	8.01	9.01	5.36	25.06	30.44	2.83	13.35	16.18	46.62
Raton	34.79	38.82	73.61	64.20	70.50	134.70	25.70	21.03	47.73	182.43
Total	1061.97	1840.99	2922.96	0.00 2008.82	4277.25	6286.77	0.00 897.72	2126.93	3024.65	9310.42

Note: Calculations are based on beds of 2.5 foot foot thickness or more. A 10:1 strip ratio indicates there are 10 feet of overburden for every foot of coal.
Zero indicates no measured or indicated reserve data available (data from the NM Institute of Mining and Technology, Bureau of Geology and Mineral Resources, 1998).

Figure 15 provides information on production, value, employment, payroll and revenue generated for coal over the last five years.

PRODUCTION/VALUE

The state's coal production and reserves is compared with that of other western states in Table 1 of the Overview section. New Mexico ranks 12th nationally in the coal production, the same as in 2001. Coal production was down in 2002 to 28.5 million short tons (st) compared to the record 30.5 million st produced in 2001 and 27.3 million st in 2000. New Mexico coal production, by mine, for the past five years is provided in Table 11.

Of the total coal production 27.5 million st were sold yielding a production value of $619 million, compared to $585 million in 2001 and $554 million in 2000. The average price per ton in 2002, derived by dividing total production value by total tons sold, was $22.50 compared to $19.16 in 2001 and $20.42 in 2000. Nationally the average price per ton in 2002 was $17.98. This figure was derived by dividing the total free on board (f.o.b.) rail/barge value of the coal by the total coal sold. New Mexico's price has been higher than the nation's since 1987.

PAYROLL

Coal employment was 1588 direct and 175 contract employees for a total of 1763 compared 1932 in 2001 and 1710 in 2000. Out of the 1763 total employees, 83 were employed in reclamation. Industry payroll amounted to over $115 million compared to $110 million in 2001 and $100 million in 2000.

RESERVES

New Mexico has 39.6 billion st of strippable and deep coal resources and 9.3 billion st of surface-minable reserves at depths of zero to 250 feet according to the 1996 estimates of the New Mexico Bureau of Geology and Mineral Resources. Surface-minable reserves in the state, by field, are provided in Table 12. Nationally, New Mexico ranked 3rd in recoverable coal reserves at producing mines.

Quality characteristics for selected New Mexico coalfields are compared in Table 13. New Mexico coal ranges from anthracite and semi-anthracite (Cerrillos field), through high-heat content, coking-quality bituminous (Raton Basin), to non-coking, lower-rank subbituminous (San Juan Basin), and is generally low in sulfur content. Most of New Mexico's produced coal is bituminous or subbituminous. According to the Energy Information Agency approximately 50% of coal produced in the state during 2002 is classified as bituminous and 50% is subbituminous. For just those operations active in 2002, heat value (in

Table 13. Quality Characteristics of Coal for Selected Fields in New Mexico

Location	Proximate Moisture %	Proximate Ash %	Volatile Matter %	Fixed Carbon %	Sulfur %	Heat Content (Btu/lb)	No. Samples Analyzed
Fruitland	8.41	19.35	33.10	39.14	0.83	10,126	245
Raton	2.79	12.93	34.95	49.88	0.61	12,413	205
Cerrillos	2.94	10.90	22.03	64.90	1.04	12,858	87
Barker Creek	10.23	7.03	38.40	44.33	0.90	11,497	3
Hogback	10.08	9.78	36.30	43.83	0.80	10,920	8
Newcomb	17.04	11.04	32.66	39.28	1.08	9,580	7
Hagan	10.58	8.28	37.95	43.23	0.88	10,506	10
Tijeras	4.20	15.83	34.93	45.03	1.88	11,103	3
Datil	7.60	12.13	37.75	42.57	0.80	11,256	21
Jornada	2.70	8.30	42.55	46.45	0.80	13,140	2
Sierra Blanca	5.53	13.50	31.46	47.24	0.75	11,175	15
Navajo	13.27	19.70	31.05	35.51	0.80	9,012	141
Eagle	12.00	20.10	24.40	43.50	0.40	7,665	2
Salt Lake	12.26	17.17	32.21	37.21	0.70	9,396	160
Tierra Amarilla	18.70	8.50	32.60	40.20	1.05	9,875	2
Bisti	13.79	19.40	30.93	35.74	0.52	8,762	109
Chaco Canyon	16.32	7.68	33.17	42.38	1.38	10,210	4
Star Lake	12.70	22.08	31.72	33.50	0.56	8,665	105
Chacra Canyon	15.23	9.63	35.77	39.37	0.80	10,203	59
La Ventana	15.93	10.20	36.02	38.36	1.19	10,347	110
East Mt. Taylor	9.64	8.30	43.15	48.57	0.77	11,738	20
South Mt. Taylor	8.93	8.90	36.83	45.67	0.74	11,288	3
Standing Rock	16.73	13.00	34.04	36.51	0.97	9,579	62
Crownpoint	15.76	10.63	35.29	37.89	1.48	10,205	32
Gallup	13.18	8.52	38.12	39.93	0.81	10,507	158
Zuni	11.25	12.40	38.25	40.10	1.15	11,030	2
Monero	3.33	11.48	37.68	49.23	1.28	12,483	47
Rio Puerco	14.80	8.35	35.38	41.67	0.92	9,445	4
Carthage	3.38	11.59	36.62	48.68	0.83	12,508	11
San Mateo	13.65	11.78	39.65	40.42	0.83	10,161	203

Note: Ash content less than 33 %.
Data from the New Mexico Institute of Mining and Technology, Bureau of Geology and Mineral Resources, 1996.

BTUs/lb.) ranges from 8,891 to 11,678, with an average of 10,366; average sulfur content is about 0.71%; average ash content is about 20%.

REVENUES

Revenues generated from severance, resources excise, and conservation taxes on the state's coal production in 2002 totaled $26.2 million. Royalties and rentals received from coal leases on state lands for 2002 were almost $61,000. Additionally, the state receives 50% of royalties collected by the federal government from leases on public domain land that amounted to over $21 million in fiscal year 2003.

American Indian royalty collections during FY01 (the most recent information available) were $24.5 million resulting from a sales volume of 10.3 million st of coal. (Source: DOE, Minerals Management Service)

Humate, which is humic acid salts, is discussed in the Industrial Minerals section of the Non-fuel Minerals Chapter.

COAL RELATED WEBSITES

Department of Energy, Energy Information Administration:
http://www.eia.doe.gov

Bureau of Geology and Mineral Resources:
http://geoinfo.nmt.edu

URANIUM

U.S. URANIUM

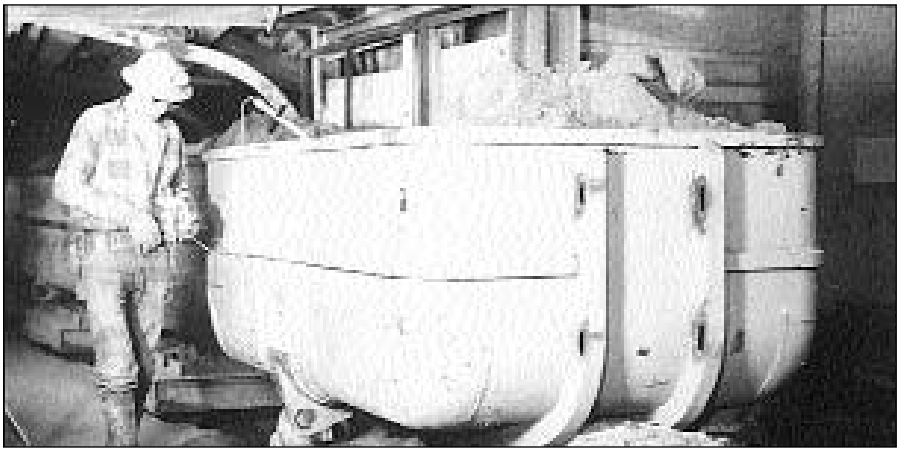
U.S. uranium concentrate production totaled 2.3 million pounds in 2002, a 63 percent decline from 1996. Almost all of the concentrate production came from in-situ leaching in 2002. Employment in the U.S. uranium raw materials industry totaled 426 person-years in 2002, a decrease of 62 percent from the 1998 level. (Source: DOE, Energy Information Administration Uranium Industry Annual 2002)

NEW MEXICO URANIUM

New Mexico is second only to Wyoming in uranium reserves, but lags behind most other uranium states in production. Only one company in New Mexico, Rio Algom Mining LLC (formerly Quivira), produced uranium in 2002 from waters recovered from inactive underground operations at Ambrosia Lake in Grants. All recovery ceased in December 2002. Approximately 18,491 (lbs) of U_3O_8 in concentrate ("yellowcake") were produced from mine-water recovery in 2002 compared to 22,006 lbs in 2001; 21,548 lbs in 2000; and 232,000 lbs in 1999. Industry payroll amounted to just under $1 million with total employment at 27 people, almost all attributed to the Ambrosia Lake facility.

In 2002 BHP Billiton acquired Rio Algom Mining Limited. As a result, Quivira Mining Company was merged into Rio Algom Mining LLC. With the sale of its Wyoming uranium operations to Camaco, Rio Algom has exited the uranium production business. Its sole operations in New Mexico will be mine and mill reclamation, scheduled to be completed in 2006 or sooner.

According to an Albuquerque Journal article (September 1, 2003) an international consortium wants to build a billion-dollar-plus Lea County facility to produce fuel for nuclear reactors. Louisiana Energy Services, or LES, announced that the $1.2 billion uranium enrichment plant would be built off N.M. 176 five miles east of Eunice near the Texas-New Mexico border. Construction could begin within three years if the permit process goes smoothly. LES switched to New Mexico after community resistance in Hartsville, Tenn., where it had proposed to build the facility after meeting opposition in Louisiana, its first choice. The planned Lea County facility would provide uranium for the U.S. nuclear industry with oversight from the NRC and the state Environment Department. The plant is expected to employ 200 to 400 people during construction and about 250 during operation. The company said the annual payroll will be about $10 million with an average salary of about $50,000.



An inspector determines overall grade of uranium ore with at T (Gieger Counter) probe in Ambrosia Lake Mine, 1968. (Source: Bureau of Geology and Mineral Resources Historic Photo Archive Collection)

The following is provided by Dr. Virginia T. McLemore, NM Bureau of Geology and Mineral Resources:

Quivira Mining Co. is no longer producing uranium and the Ambrosia Lake mill and mines will be reclaimed by 2006. Mine-water recovery ceased in 1992, because of decline in the price of uranium, but resumed in 1994 and ceased in 2002. New Mexico ranks 2nd in uranium reserves in the U. S., which amount to 15 million tons ore at 0.277% U_3O_8 (84 million lbs U_3O_8) at $30/lb (Energy Information Administration).

Other operations in New Mexico remain inactive in 2002. Hydro Resources, Inc. (subsidiary of Uranium Resources Inc.) has put its plans on hold to mine uranium by in-situ leaching at Church Rock and Crownpoint until the uranium price increases. Hydro Resources, Inc. also leases properties at Crownpoint from New Mexico and Arizona Land Company LLC (formerly NZU). Hydro Resources, Inc. also owns the Santa Fe Railroad properties in the Ambrosia Lake subdistrict. Rio Grande Resources Co. is maintaining the closed facilities at the flooded Mt. Taylor underground mine, in Cibola County. In late 1997, Anaconda Uranium acquired the La Jara Mesa uranium deposit in Cibola County from Homestake Mining Co. Homestake completed reclamation drilling in January 2002 and plans to complete reclamation of the Homestake mill at Milan in 2004.

Additional information on uranium can be found on the following website: http://www.eia.doe.gov

EXTRACTIVE NON-FUEL RESOURCES

COPPER

Copper is usually found in nature in association with sulfur. Pure copper metal is generally produced from a multistage process, beginning with the mining and concentrating of low-grade ores containing copper sulfide minerals, and followed by smelting and electrolytic refining to produce a pure copper cathode. An increasing share of copper is produced from acid leaching of oxidized ores.

Copper is one of the oldest metals ever used and has been one of the important materials in the development of civilization. Because of its properties, singularly or in combination, of high ductility, malleability, and thermal and electrical conductivity, and its resistance to corrosion, copper has become a major industrial metal, ranking third after iron and aluminum in terms of quantities consumed.

Electrical uses of copper, including power transmission and generation, building wiring, telecommunication, and electrical and electronic products, account for about three quarters of total copper use. Building construction is the single largest market, followed by electronics and electronic products, transportation, industrial machinery, and consumer and general products. Copper byproducts from manufacturing and obsolete copper products are readily recycled and contribute significantly to copper supply.

Aluminum substitutes for copper in various products, such as electrical power cables, electrical equipment, automobile radiators, and cooling/refrigeration tubing. In some applications titanium and steel are used in heat exchangers, and steel is used for artillery shell casings. Optical fiber substitutes for copper in some telecommunications applications. Plastics also substitute for copper in water pipe, plumbing fixtures, and many structural applications.

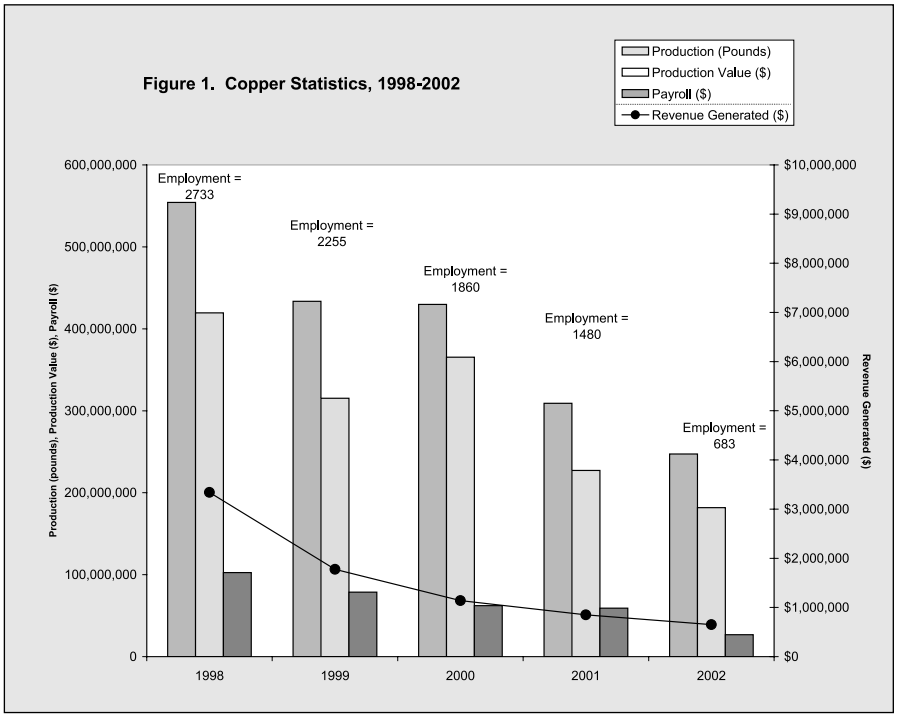
U.S. domestic mine production in 2002 declined to 1.13 million metric tons and was valued at about $1.9 billion. The principal mining states, in descending order, Arizona, Utah, and New Mexico, accounted for 99% of domestic production; copper was also recovered at mines in three other States. (Source: USGS)

N.M. OVERVIEW

The copper and base metals industry are located principally in Grant and Hidalgo Counties in southwest New Mexico. The state ranks third nationally in copper production after Arizona and Utah. New Mexico copper is used chiefly in the manufacture of electrical wire.

Copper production in New Mexico totaled just over 247 million pounds (lbs) compared to 310 million lbs in 2001 and 430 million lbs in 2000. Figure 1 provides copper statistics over the previous 5 years. Copper production was valued at $182 million compared to $227 million in 2001 and $365 million in 2000. The average price for copper in New Mexico was $0.74/lb in 2002 compared to $0.76/lb in 2001 and $0.89/lb in 2000. Employment in 2002 included 546 employees at all mines and mills (down from 985 in 2001 and 1333 in 2000), and 137 at smelters (down from 495 in 2001 and 517 in 2000) for total copper employment of 683 during 2002

Figure 1. Copper Statistics, 1998-2002



(down from 1480 in 2001 and 1860 in 2000). Out of the total, direct (non-contract) employees numbered 628 compared to 1271 in 2001. Payroll at all mines, mills and smelters amounted to $26.7 million down from $59.2 million in 2001. Revenue generated from copper, which includes state severance and resources excise tax equals, $0.65 million down from $0.85 million in 2001. No sulfuric acid was produced at the Hurley smelter in 2002 compared to over 250,000 lbs the previous year.

In 2002, Phelps Dodge Mining Company announced a restructuring plan that included suspension of operations at the Chino open pit mine and smelter. In 2001, the company announced a suspension of operations at the Chino concentrator. These facilities are under care and maintenance. Production continues at the SX/EW plant at reduced rates There have been no large-scale recalls or reductions-in-force during 2003 at Phelps Dodge Operations. Mine operations at the Santa Rita mine have resumed at a reduced rate while production at Tyrone has decreased such that total employment has not changed significantly. (Source: Phelps Dodge website)

COPPER RELATED WEBSITES

U.S. Geological Survey:
http://minerals.er.usgs.gov/minerals/pubs/commodity/copper/

NM Bureau of Geology and Mineral Resources:
http://geoinfo.nmt.edu

GOLD AND SILVER

U.S. GOLD AND SILVER

Domestic gold mine production in 2002 was estimated at about 10% less than the level of 2001, but high enough to maintain the United States' position as the world's second largest gold-producing nation, after South Africa. In 2002, the value of mine production was more than $2.9 billion. Estimated uses were: jewelry and arts, 85%; dental, 10%; and electrical and electronics, 5%. Domestic output continued to be dominated by Nevada, where combined production accounted for more than 75% of the U.S. total.

In 2002, U.S. mine production of silver was about 1,470 tons with an estimated value of $214 million. Nevada was the largest producer, with more than 600 tons. Aesthetic uses of silver for decorative articles, jewelry, tableware, and coinage were overshadowed by industrial and technical uses that include photographic materials, electrical and electronic products, catalysts, brazing alloys, dental amalgam, and bearings. Digital imaging has become a serious threat to silver-based photographic applications. In contrast to the use of silver halide film in conventional photography, digital technology converts images directly into electronic form, thereby avoiding the need for silver. Silver halide pictures may also be scanned into electronic form, which necessitates the use of silver in taking and printing the picture, but eliminates the need for silver halide technology in further processing.

(Source: USGS)

NEW MEXICO GOLD AND SILVER

Over the past several years gold and silver were produced only as byproducts of copper processing from copper operations in Grant County.

No gold was produced in the state in 2002. This compares to 3,297 troy ounces (tr oz) of gold recovered in 2001 and 15,613 tr oz in 2000. No silver was produced in the state in 2002. This compares to 42,660 tr oz of silver recovered in 2001 and 207,788 tr oz in 2000. The only silver recovery was from the Chino Hurley Smelter amounting to 78,418 tr oz. Because the smelter also receives ore from Arizona mines the production cannot be attributed entirely to New Mexico.

Since the temporary curtailment of milling and concentrating operations at the Ivanhoe concentrator in 2001, gold, silver and molybdenum byproducts have not been produced at the Santa Rita Mine. Also, gold and silver production from the Hurley Smelter has not occurred since the temporary curtailment of smelter operations in early 2002. Production activities at both the Ivanhoe Concentrator and the Hurley Smelter may resume when the current economic situation improves. (Source: pers. comm. with Tom L. Shelley, Tyrone)

GOLD AND SILVER RELATED WEBSITES

U.S. Geological Survey:
http://minerals.er.usgs.gov/minerals/pubs/commodity/gold/

U.S. Geological Survey:
http://minerals.er.usgs.gov/minerals/pubs/commodity/silver/

NM Bureau of Geology and Mineral Resources:
http://geoinfo.nmt.edu

MOLYBDENUM

MOLYBDENUM

Molybdenum is a metallic element used principally as an alloying agent in steel, cast iron, and superalloys. It enhances hardenability, strength, toughness, and wear and corrosion resistance. To achieve these desired metallurgical properties it is combined with, or added to, chromium, columbium, manganese, nickel, tungsten, or other alloy metals. Molybdenum's ability and versatility in enhancing alloy properties has ensured it a significant role in modern industrial technology. It is also used as a refractory metal in numerous chemical applications such as catalysts, lubricants and pigments.

U.S. MOLYBDENUM

In 2002, molybdenum, valued at about $270 million (based on average oxide price), was produced by six mines. Molybdenum ore was produced at three mines, one each in Colorado, Idaho, and New Mexico, whereas three mines in Arizona and Utah recovered molybdenum as a byproduct. Iron and steel, cast and wrought alloy, and superalloy producers accounted for about 70% of the molybdenum consumed.

U.S. mine output of molybdenum in 2002 decreased an estimated 13% from that of 2001. U.S. imports for consumption decreased an estimated 26% from those of 2001, while the U.S. exports decreased 27% from those of 2001. U.S. reported consumption decreased 17% from that of 2001. End-use applications were as follows: machinery, 35%; electrical, 15%; transportation, 15%; chemicals, 10%; oil and gas industry, 10%; and other, 15%.
(Source: USGS Mineral Commodity Summary – Molybdenum, January 2003)

NEW MEXICO MOLYBDENUM

Molycorp Inc. (a subsidiary of Unocal Corporation) operates the Questa mine and mill. The Questa operation is the state's only primary molybdenum producer, the largest employer in Taos County and has operated at the site sporadically since the early part of this century. It closed in 1992 due to falling molybdenum prices and reopened in 1996. Unocal began mining at Questa in the 1970s.

During calendar year 2002 Molycorp continued to develop a new ore body called the "D" ore body, which began production in early October 2000. Because of development work in this ore body the work force was increased in the fall of 2000.

On June 3, 2002, the New Mexico Mining and Minerals Division approved a closeout plan permit for Molycorp's molybdenum mine in Questa, New Mexico. This permit, in addition to approving the current plan for future closure of mining operation, also requires Molycorp to provide satisfactory financial assurance for eventual reclamation of the site. While the state laws require reclamation following closure, Molycorp has agreed to start the reclamation process with the funding (a minimum of $3 million per year) to begin in 2003. In addition, Molycorp will revise the Closeout Plan in 2004 after further studies are completed. (Source: Molycorp press release)

PRODUCTION/VALUE

Molybdenum disulfide recovery from Molycorp in 2002 was 3.8 million pounds (lbs) compared to 2.7 million lbs in 2001 and less that 1 million lbs in 2000.
The value of the molybdenite sold by Molycorp in 2002 was $17.3 million which is a substantial increase over the previous year. According to the USGS, the price of molybdenum increased about 60% from 2001 to 2002 to about $3.80 per pound. August 2003 data from USGS indicate prices ranging from $5.80 to $6.00 per pound.

EMPLOYMENT/PAYROLL

In December 2001 Molycorp, Inc., responding to a long slump in molybdenum prices, laid off 67 employees in Questa and eliminated 35 contractor positions effective February 1, 2002.

Total employment for Molycorp during 2002 was 158 (139 direct and 19 contract) employees compared to about 195 in 2000 and 2001. Molycorp payroll amounted to $7 million compared to $10 million in 2001.

RESERVES

When proven and probable reserves are considered, the mine life is 25-35 years, and when resources are included the mine life is 50-80 years. (Source: Dr.Virginia T. McLemore, Bureau of Geology and Mineral Resources, Socorro, NM)

MOLYBDENUM RELATED WEBSITES

U.S. Geological Survey:
http://minerals.er.usgs.gov/minerals/pubs/commodity/molybdenum

NM Bureau of Geology and Mineral Resources:
http://geoinfo.nmt.edu

POTASH

Potash represents a variety of mined and manufactured salts, all containing the element potassium in water-soluble form. Potash can be potassium chloride (KCl) also known as sylvite; potassium/magnesium sulfate ($K_2SO_4 \cdot 2MgSO_4$) or langbeinite; potassium sulfate (K_2SO_4); potassium nitrate (KNO_3) or saltpeter; or mixed sodium/potassium nitrate ($NaNO_3 + KNO_3$) also know as Chilean saltpeter.

Potash is used primarily as an agricultural fertilizer (plant nutrient) because it is a source of soluble potassium, one of the three primary plant nutrients; the others are fixed nitrogen and soluble phosphorus. Potash and phosphorus are mined products, and fixed nitrogen is produced from the atmosphere by using industrial processes. Modern agricultural practice uses these primary nutrients in large amounts to assure plant health and proper maturation. The three major plant nutrients have no substitutes, but low-nutrient-content, alternative sources of plant nutrients, such as animal manure and guano, bone meal, compost, glauconite, and "tankage" from slaughterhouses, can be used. (Source: USGS)

U.S. POTASH

In 2002, the value of production of marketable potash, f.o.b. mine, was about $280 million; sales decreased relative to 2001. Prices declined for New Mexico producers in the first half of the year, but demand increased in the second half due to smaller crop harvests, which led to small price increases. Domestic potash was produced from Michigan, New Mexico, and Utah. Most of the production was from southeastern New Mexico, where two companies operated three mines. New Mexico sylvinite and langbeinite ores were beneficiated by flotation, heavy media separation, dissolution-recrystallization, or combinations of these processes, and provided more than 70% of U.S. producer total sales.

The fertilizer industry used about 80% of U.S. potash sales, and the chemical industry used the remainder. More than 60% of the potash was produced as potassium chloride (muriate of potash). Potassium sulfate (sulfate of potash) and potassium magnesium sulfate (sulfate of potash-magnesia), required by certain crops and soils, were also sold.

(Source: USGS, Mineral Commodity Summary - Potash, January 2003)

NEW MEXICO POTASH

Statistical information on the potash industry in the state is provided in Figure 2. Most U.S. potash production comes from New Mexico, where two companies operate three mines and employ approximately 1,000 workers in Eddy and Lea Counties.

The Carlsbad potash district is the largest potash producing area in the U.S. Mississippi Potash, Inc. (a subsidiary of Mississippi Chemical Corporation) and IMC Kalium Potash Mines (a subsidiary of IMC Global Inc.) operate mines in the district. Potash is used as fertilizer and as a chemical in specialty and industrial markets. Langbeinite ($K_2SO_4 \cdot 2MgSO_4$) and sylvite (KCl) are the primary potash minerals found in Permian evaporites of the Permian Basin in New Mexico. Mining is by underground methods. The estimated potash reserves in the district amount to greater than 553 million tons. Sodium salt also is produced locally as a by-product. Salt is used in oil field

Figure 2. Potash Statistics, 1998-2002

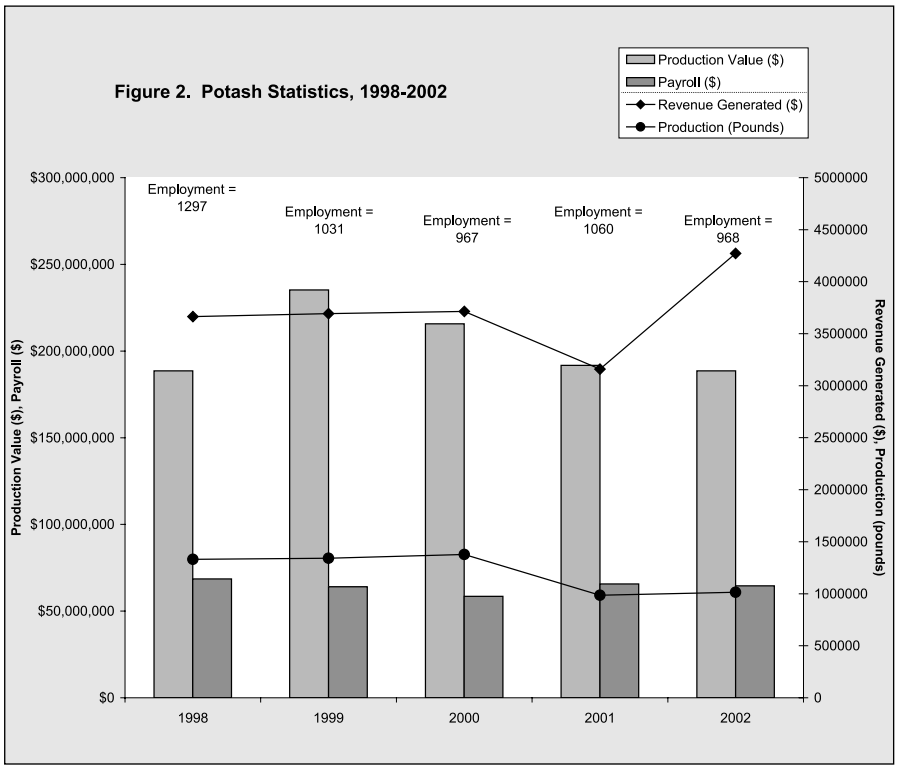


Table 1. Potash Revenues, 2002

Severance Tax	$678,556
Resources Tax	$255,952
State Land Office Royalties/Rentals	$936,869
Federal revenues	$2,401,277
Grand Total	**$4,272,653**

drilling, animal feed, and to de-ice roads. (Source: Dr. Virginia T. McLemore, Senior Economic Geologist, NM Bureau of Geology and Mineral Resources, Socorro)

PRODUCTION/VALUE

Potash ore mill production (in K_2O tons) in 2001 totaled over 1 million short tons (st) compared to 0.98 million st in 2001. Sales of potassium salts increased to 1.2 million st compared to 0.96 million st in 2001 and 1.35 million st in 2000. Sales value in 2002 was almost $189 million compared to $192 million in 2001 and $216 million in 2000.

EMPLOYMENT/PAYROLL

The potash industry employed approximately 968 people in the Carlsbad area in 2001 compared to 1060 in 2001 and 967 in 2000. Industry payroll for 2002 was about $65 million compared to $66 million in 2001 and $59 million in 2000.

Mississippi Chemical Corporation announced in a press release on June 18, 2003 that it would temporarily idle its two potash mines at Mississippi Potash, Inc., in Carlsbad, New Mexico, on June 20. The company's East and West potash mines shut down primarily due to excess inventories. While the mines were down, customer needs were met from existing inventory. The West mine resumed full production in September and the East mine was fully operational in mid-October. At Carlsbad, 378 employees will be furloughed. The company currently is operating under Chapter 11 reorganization, filed on May 15 of this year.

According to news article in the Albuquerque Journal (6-28-03) IMC Global Inc., the parent company of Carlsbad's IMC Kalium, sold part of its Carlsbad business to Kansas-based Salt Holdings Corp. in a two part deal worth more than $60 million. IMC sold one of its three lines of business - sulfate of potash. IMC stated that it did not know whether the sale would result in any layoffs because the sulfate of potash line represents a small proportion of their entire operation.

REVENUES

Information related to revenues generated by the potash industry in the state is provided in Table 1.

POTASH RELATED WEBSITES

US Geological Survey: http://minerals.usgs.gov/minerals/pubs/commodity/potash/

Continuous miner at the west mine (Source: Mississippi Potash, Inc.)

INDUSTRIAL MINERALS

In 2002 there were 38 industrial mineral operations registered in the state compared to 39 in 2001. Industrial minerals include clay, dimension and flagstone, gypsum, humate, limestone, mica, perlite, pumice, salt, silica sand, scoria, shale, silica flux and zeolite. Depending on the end use certain mineral commodities can be categorized as industrial minerals, stone and aggregate minerals, or both. In 2002 minerals in both categories include clay, shale, dimension and flagstone, and limestone. Information on stone and aggregate is provided separately below.

Figure 3 provides the location of major producing areas for industrial and other mineral commodities. Information on selected industrial minerals, including name, county, employees and national production rank is provided in Table 2. The industrial minerals industry employed 599 workers in 2002 compared to 735 the previous year and 756 in 2000. Total payroll amounted to $17.7 million in 2002 compared to $21.2 million in 2001 and $17.7 million in 2000. The industry produced 2.4 million short tons (st) of materials from all mines and mills down from 2.6 million st in 2001. Production value was $174.6 million up from $166.7 million in 2001.

PERLITE

Perlite is weathered, natural glass that is formed by the rapid cooling of viscous, high-silica rhyolite lava. Perlite is used in building construction products, horticultural aggregate, filter aids, and fillers. The estimated value of processed perlite produced in 2002 was $18.5 million. Production of domestic perlite decreased about 7% and imports of perlite increased 20% compared with that of 2001. Domestic production decreased for the third year in a row while imports reached an all time high. (Source: USGS)

New Mexico led the nation in production of perlite. Active operations include: Dicaperl's El Grande Mine/Mill and Socorro Perlite Mine/Mill in Taos and Socorro Counties, respectively; and Harborlite's No Agua Mine/Mill in Taos County. 84 employees were reported for the perlite industry, down 10 employees from 2001 with a yearly payroll of $2.8 million compared to $3.2 million in 2001.

GYPSUM

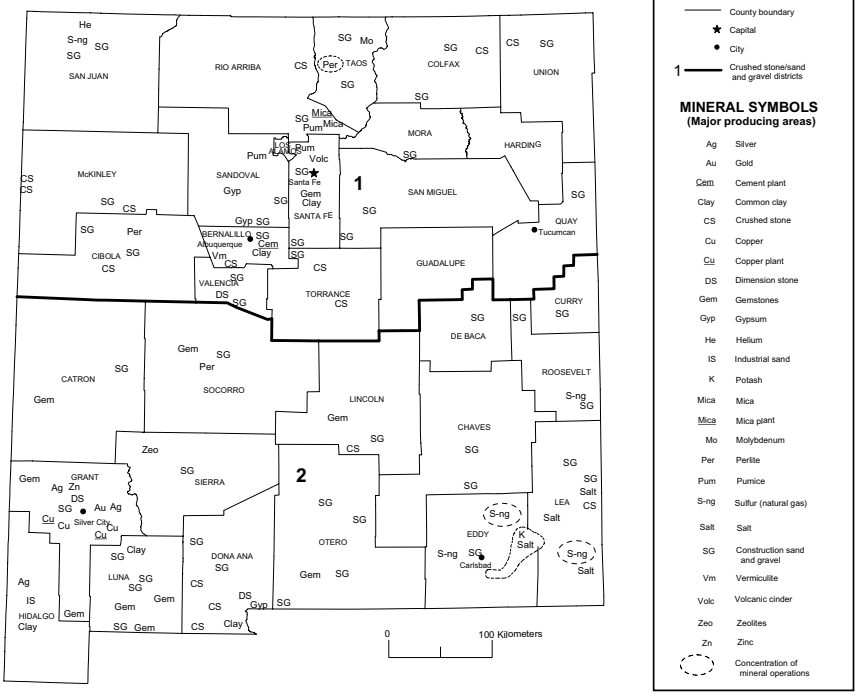
Gypsum, one of the most widely used minerals in the world, literally surrounds us every day. Most gypsum in the United States is used to make wallboard for homes, offices, and commercial buildings; a typical new American home contains more than 7 metric tons of gypsum alone. Moreover, gypsum is used worldwide in concrete for highways, bridges, buildings, and many other structures that are part of our everyday life. Gypsum also is used extensively as a soil conditioner on large tracts of land in suburban areas, as well as in agricultural regions. (Source: USGS)

New Mexico ranked 13th in the U.S. in the production of crude gypsum in 2002. Four operations were registered in 2002 with employment of 141 and a payroll of $4.1 million.

PUMICE

The main use for pumice is as an aggregate in lightweight building blocks and assorted building products. The other major applications for pumice and pumicite include abrasive, absorbent, concrete aggregate and admixture, filter aid, horticultural (including landscaping), and the stonewashing of denim. (Source: USGS)

Figure 3. Location of Industrial Minerals in New Mexico



Source: New Mexico Bureau of Geology and Mineral Resources/U.S. Geological Survey (2001)

New Mexico is 3rd in the U.S. in pumice production after Oregon and Arizona. Seven operations were registered in 2002 employing 45 people with a payroll of $716 thousand.

HUMATE

Humates are weathered coal or highly organic mudstone that is found in the coal-bearing sequences. New Mexico has significant concentration of humates, predominantly in the Fruitland and Menefee formations in the eastern San Juan Basin. Humate is used as a soil conditioner and as an additive to drilling muds. Approximately 12.1 billion short tons of humate resources are within the San Juan Basin. (Source: Dr. Virginia T. McLemore and Gretchen Hoffman, NM Bureau of Geology and Mineral Resources, Socorro)

Humate mines/mills in 2002 include: Reid Enterprise's Mesa Verde Resources Mill in Sandoval County supplied by the Star Lake Mine in McKinley County; Dirtwork's Eagle Mesa Mine and the Menefee Mining Corporation's Mine/Mill in Sandoval County and Star Lake Mine in McKinley County. The humate industry employs 23 people with a $155 thousand payroll.

SALT

Salt, also known as sodium chloride, has many end uses. Virtually every person in the world has some direct or indirect contact with salt daily. People routinely add salt to their food as a flavor enhancer or apply rock salt to walkways to remove ice in the winter. Salt is used as feedstock for chlorine and caustic soda manufacture; these two inorganic chemicals are used to make many consumer-related end-use products, such as polyvinyl chloride (PVC) plastic made from chlorine and paper-pulping chemicals manufactured from caustic soda. (Source: USGS)

Table 2. Selected Industrial Minerals: Mines, Mills and Employees in 2002

Commodity	Prod. Rank[1]	Mine/Mill Name	County	Employees[2]
Clay		Kinney Brick Mill	Bernallilo	2
Dimension & Flagstone		New Mexico Travertine Plant	Valencia	28
Gypsum	13	Centex Albuquerque Plant	Bernalillo	50
		Centex Bernalillo Plant	Bernalillo	60
		Keystone #1 Mine/Mill	Dona Ana	1
		White Mesa Mine	Sandoval	30
Humate		Eagle Mesa Mine	Sandoval	2
		Menefee Mining Corp. Mill	Sandoval	8
		Mesa Verde Resources Mill/Reid	Sandoval	10
		Star Lake Mine/Menefee Mining	McKinley	1
		Star Lake Mine/Reid Enterprises	McKinley	2
Limestone		Tijeras Pit/Plant	Bernallilo	94
Mica	4	Velarde Mill	Rio Arriba	41
		U. S. Hill Mine	Taos	8
Perlite	1	Socorro Perlite Mine/Mill	Socorro	33
		El Grande Mine/Mill	Taos	23
		No Agua Mine/Mill	Taos	28
Pumice	3	CR Minerals Mill	Santa Fe	13
		El Cajete Mine	Sandoval	8
		Espanola Plant	Rio Arriba	6
		Guaje Canyon Mine	Santa Fe	6
		Rocky Mountain Mine	Rio Arriba	2
		San Ysidro Plant	Sandoval	6
		Utility Block Company Forest Service Mine/Mill	Sandoval	4
Salt	11	New Mexico Salt & Minerals Mine/Mill	Eddy	2
		United Salt Corp. Mill	Eddy	74
		United Salt Corp. Mine	Eddy	14
Sand		Silver Silica	Santa Fe	3
Scoria		Crego Block Mill	Santa Fe	1
Shale		Eagle Mine/Mill	Dona Ana	3
Silica / Flux		KB Mine	Grant	1
Zeolites		Zeolite Mine (Stone House)	Sierra	35
TOTAL				**599**

[1] USGS 2002 Ranking
[2] Includes both direct and contract employees
Notes: A few industrial mineral operations are included with aggregate/stone

Salt operations in the state include New Mexico Salt & Minerals and United Salt Corporation located in Eddy County. New Mexico ranked 11th in the production of salt in 2002 and employed 90 people with a payroll of over $2 million.

STONE AND AGGREGATE

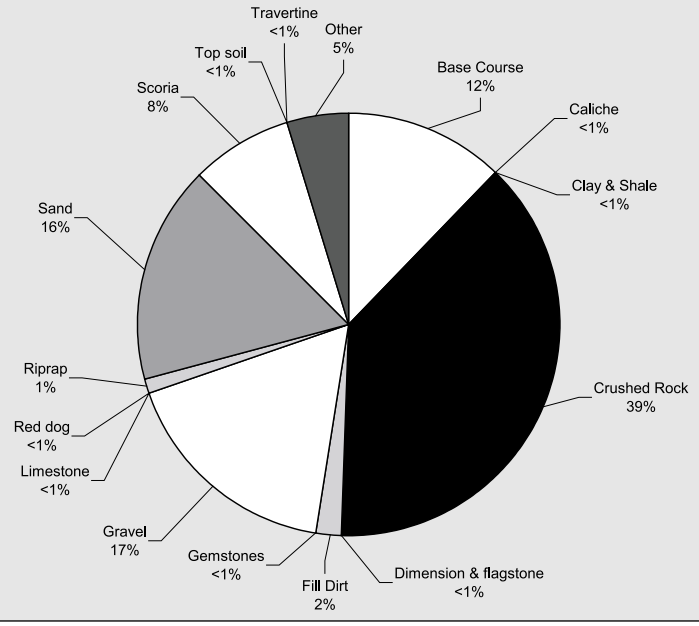
U.S. Production – Sand and Gravel: Construction sand and gravel valued at $5.8 billion was produced by an estimated 4,000 companies from 6,300 operations in 50 States. Leading States, in order of decreasing tonnage, were California, Texas, Michigan, Arizona, Ohio, Minnesota, Washington, Colorado, and Wisconsin, which together accounted for about 51% of the total output. Primary uses include concrete aggregates; road base, coverings and road stabilization; asphaltic concrete aggregates; and construction fill.

Table 3. Aggregate and Stone Production and Value

Commodity	Quantity (in short tons)	Sales Value ($)
Base Course	2,254,048	8,889,159
Caliche	2,431	2,677
Clay & Shale	112	w
Crushed Rock	4,896,763	28,295,151
Dimension & flagstone	1,295	w
Fill Dirt	1,220,980	1,430,478
Gemstones	1	w
Gravel	2,370,636	12,537,967
Limestone	55,710	w
Red dog	837	w
Riprap	93,198	934,189
Sand	2,249,984	12,112,052
Scoria	466,892	5,735,779
Top soil	9,461	50,597
Travertine	148	w
Other	1,819,014	3,463,167
Total	**15,441,510**	**73,499,683**

Note: w = confidential information withheld; but included in total
All Data from EMNRD Mining and Minerals Division

Figure 4. Percentage of Total Aggregate and Stone Production Value, by Commodity



The construction sand and gravel industry continues to be concerned with safety and health regulations and environmental restrictions. Movement of sand and gravel operations away from highly populated centers is expected to continue where local zoning and land development regulations discourage sand and gravel operations. Consequently, shortages of construction sand and gravel in urban and industrialized areas also are expected to increase. (Source: USGS Mineral Commodity Summary – Sand and Gravel, January 2003)

New Mexico: Aggregate resources produced include sand, gravel, base course, caliche, crushed rock, riprap, scoria, fill dirt, clay, shale, dimension and flagstone, limestone, red dog, travertine and top soil. The aggregate and stone mining industry had 169 active mining operations registered in New Mexico during 2002, four more than in 2001. The industry employed 700 direct and 278 contract employees for a total of 978 compared to 1030 in 2001. Yearly industry payroll was about $16.5 million in 2002 compared to $14.9 million the previous year. Total combined mine and mill production was 15.4 million st up from 12.4 million st in 2001. Production was valued at $73.5 million compared to $61 million in 2002. Production and value, by commodity, are provided in Table 3. Figure 4 provides percent of total production value, by commodity. The figure indicates that crushed stone, sand and gravel account for over 70% of all production value.

Other Industrial Minerals

Zeolites: Zeolites are hydrated aluminosilicates of the alkaline and alkaline-earth metals. About 40 natural zeolites have been identified during the past 200 years and more than 150 zeolites have been synthesized. Natural and synthetic zeolites are used commercially because of their unique adsorption, ion-exchange, molecular sieve, and catalytic properties. Major markets for natural zeolites are pet litter, animal feed, horticultural applications (soil conditioners and growth media), and wastewater treatment. (Source: USGS Minerals Yearbook – Zeolite, 2002)

St. Cloud Mining Co. (a subsidiary of Imagin Minerals, Inc.) operates the largest zeolite mine in the U. S. at the Stone House mine in Sierra County. Imagin Minerals, Inc. bought the St. Cloud Mining Company from The Goldfield Corporation in December 2002. The company has operated the open pit mine since 1993. The mining properties consist of approximately 1,500 acres and contain 18.3 million tons of reserves (The Goldfield Corporation Form 10K to Securities and Exchange Commission, 2002). In 2001, St. Cloud produced 15,951 tons of

natural zeolite. St. Cloud Mining Co. also has made several modifications to its zeolite operation, including the addition of cation exchange capacity for added value products and additional classification capabilities to expand markets for their products. The modern facility has the crushing and sizing capacity of 500 tons per day. (Source: Dr. Virginia T. McLemore, Senior Economic Geologist, NM Bureau of Geology and Mineral Resources, Socorro, NM)

Mica: Scrap and flake mica production, excluding low-quality sericite, was estimated to be 84,000 metric tons in 2002. North Carolina accounted for about 47% of U.S. production. The remaining output came from Arizona, Georgia, New Mexico, South Carolina, and South Dakota. Primary uses were joint compound, paint, roofing, oil well drilling additives, and rubber products. There were nine domestic producers of scrap and flake mica. (Source: USGS Mineral Commodity Summary – Mica, January 2003)

Only one mine produces mica in New Mexico, the U. S. Hill mine (formerly MICA mine) in Taos County, which has operated since 1960s. Oglebay-Norton Inc. acquired the mine in December 1999 from Franklin Industries and the company is the largest producer of muscovite mica in the United States. The current mine is the 4th largest scrap-mica mine in the U. S. and covers approximately 15 acres. The expansion calls for an increase to 90 acres within 20 years. The nearby Picuris Pueblo opposes any expansion of the mine. (Source: Dr. Virginia T. McLemore, Senior Economic Geologist, NM Bureau of Geology and Mineral Resources, Socorro, NM)

Clay: Two types of clay are mined in New Mexico: common and fire clay. Common clay is used for making bricks, roofing granules, and quarry tile. Commercial adobe yards are mostly in northern New Mexico that produce adobe bricks from local alluvial materials. New Mexico ranked 6th in production of fire clay out of six states in 1999; production amounted to 1,000 metric tons. Fire clay is quarried from Luna and Grant Counties for use in the copper smelter. (Source: Dr. Virginia T. McLemore, Senior Economic Geologist, NM Bureau of Geology and Mineral Resources, Socorro, NM)

Gemstones and semi-precious stones: The terms "gem" and "gemstone" mean any mineral or organic material (e.g., pearl and petrified wood) used for personal adornment, display, or object of art because it possesses beauty, rarity, and durability. Of the 2,700 mineral species, only about 100 possess all these attributes. Silicates compose the largest group of gemstones; oxides and quartz compose the second largest. (Source: USGS Mineral Commodity Summary – Gemstones, January 2003)

Gemstones and semi-precious stones produced in New Mexico include geodes, agate, azurite, fluorite, onyx, smithsonite, moonstone, peridot, and turquoise. Production statistics for 2002 are withheld for gemstones and semi-precious stones in New Mexico; many non-commercial collectors do not report their income. In 1993, the value of gemstone production was $22,000 and the average over the previous five years was approximately $76,000, mostly from turquoise (George Austin, Bureau of Geology and Mineral Resources). However, depletion of the known deposits and difficulty in and expense of adhering to federal, state, and local environmental regulations have closed most of the commercial mines. (Source: Dr. Virginia T. McLemore, Senior Economic Geologist, NM Bureau of Geology and Mineral Resources, Socorro, NM)

Sulfuric acid: Sulfuric acid production is the major end use for sulfur, and consumption of sulfuric acid has been regarded as one of the best indexes of a nation's industrial development. More sulfuric acid is produced in the United States every year than any other chemical. It is produced as a by-product of copper smelters in Grant County and is used in copper recovery from SX-EW plants (Source: USGS). No sulfuric acid was produced in New Mexico in 2002.

Iron ore: Iron ore is a mineral substance which, when heated in the presence of a reductant, will yield metallic iron (Fe). Iron ore is the source of primary iron for the world's iron and steel industries. It is therefore essential for the production of steel, which in turn is essential to maintain a strong industrial base. Almost all (98%) iron ore is used in steelmaking. New Mexico is 3rd in the U.S. in the production of usable iron ore. (Source: USGS)

Iron ore as magnetite is shipped from the magnetite tailings at Phelps Dodge's Cobre mine in Grant County and is used by cement plants to increase the strength of their cement. (Source: Dr. Virginia T. McLemore, Senior Economic Geologist, NM Bureau of Geology and Mineral Resources, Socorro, NM).

INDUSTRIAL MINERALS RELATED WEBSITES

U.S. Geological Survey:
http://minerals.usgs.gov/minerals/pubs/commodity/

NM Bureau of Geology and Mineral Resources:
http://geoinfo.nmt.edu

EXCELLENCE IN RECLAMATION AWARDS

Each year, the Mining and Minerals Division recognizes exemplary reclamation for regulated and unregulated mined lands in New Mexico. Award nominations are accepted in a number of different categories depending on the size of the mine, and the nature of the operation and its resulting disturbance. Nominations for awards may be made by any interested person, group or company including: consulting groups, environmental groups, the owner or operator of the mine, or the contractor performing the reclamation. Nominations are solicited in June each year and judged by MMD. Call John Pfeil at 505/476-3407 if you have questions regarding nominations.

Exemplary reclamation includes one or a combination of the following:
•new or innovative reclamation techniques which address impacts to surface water, ground water, wildlife habitat, plants or soil;
•innovative reclamation techniques applied to difficult sites having steep slopes, poor quality waste materials, or adverse climatic conditions;
•innovative reclamation techniques addressing the reconstruction of soil;
•the application of reclamation techniques not identified as specific requirements under the New Mexico Mining Act or the Coal Surface Mining Act; and/or the
•voluntary reclamation of an entire mine site or a portion of a mine site not required to be reclaimed under the Mining Act or the Coal Surface Mining Act.

THE AWARD WINNER FOR 2003 IS:

Yampa Mining Company's

De-Na-Zin Coal Mine

for their restoration of the traditional land use and achievement of all requirements specified in the surface coal mining permit.

The 2003 reclamation award was presented by EMNRD Cabinet Secretary Joanna Prukop at the New Mexico Mining Association Annual Convention in Taos on Tuesday, September 8, 2003.

Past Award Winners include:

Cyprus Amax Minerals for their El Molino Operable Unit at the Terrero site near Pecos

LAC Minerals (USA) for their Cunningham Hill mine near Cerrillos

Carbon Coal for their Carbon II and Mentmore mines near Gallup

St. Cloud Mining Company for the San Pedro mine near Golden

Smith Construction Co. for their work at abandoned mines near Albermarle and Bland

Phelps Dodge for their Pinos Altos mine near Silver City

San Juan Coal Company for their La Plata Mine near Farmington

Vulcan Materials for their Bernalillo/State Lands Project near Bernalillo

St. Cloud Mining Company for their Orogrande Mine Safeguard Project near Alamogordo

ENERGY EFFICIENCY, CONSERVATION AND RENEWABLE ENERGY RESOURCES

The Energy Conservation and Management Division (ECMD) was created by statute as an organizational unit of the New Mexico Energy, Minerals and Natural Resources Department. [Section 9-5A-4 NMSA 1978]. We plan and administer "clean energy" programs, including renewable energy, energy efficiency and conservation, and alternative transportation/ fuels. Anticipated benefits resulting from ECMD's programs are a reduction in energy consumption and expenditures; generation of new jobs and revenues; environmental protection and improvement (*e.g.*, reducing emissions of air pollutants and greenhouse gases); enhancement of public health; decreased consumptive water use for power generation; lessened dependence on foreign oil; and greater energy security and independence. Programs include:

Renewable Energy. Solar, wind, geothermal, biomass, and hydrogen technology applications in all sectors; distributed energy technologies such as fuel cells and district heating systems; co-generation (combined heat and power).

Energy Efficiency and Conservation. Technology applications such as energy control systems and efficient lighting, motors and appliances, as well as behavioral practices, that reduce energy use and costs in buildings and the transportation sector; residential/ commercial building energy codes and standards.

Alternative Transportation/Fuels. Ridesharing/carpooling; park-and-ride programs; vehicles and infrastructure for use of clean-burning fuels such as compressed natural gas (CNG), propane, ethanol (E-10, E-85), electricity, and bio-diesel.

These ECMD programs are accomplished through policy research and planning; state and federal legislative activities; data collection and analyses; public education and outreach; technical assistance; administration of federal grants for technology deployment and demonstrations; project development, implementation and evaluation with public- and private-sector partners; intradepartmental/interagency cooperation and coordination.

For the tenure of the Administration of Governor Bill Richardson, ECMD has adopted the following Mission Statement: *Develop and implement effective clean energy programs—renewable energy, energy efficiency and conservation, alternative transportation/fuels—to promote environmental and economic sustainability for New Mexico and its citizens.*

A number of programmatic objectives have been established by ECMD to help accomplish its mission. These include:

RENEWABLE ENERGY OBJECTIVES:

- ten percent (10%) of New Mexico's electricity needs met with renewable energy by 2010; and
- position New Mexico among the top three states in wind energy production by 2007.

ENERGY EFFICIENCY OBJECTIVES:

- reduce energy consumption in all sectors of the New Mexico economy, including residential, commercial, industrial, institutional (government/schools), and transportation;
- promote and facilitate sustainable, energy-efficient ("green") building construction practices throughout New Mexico.

ALTERNATIVE TRANSPORTATION/ FUELS OBJECTIVES:

- facilitate compliance with state and federal mandates for acquisition of alternative fuel vehicles; and
- assist and encourage the increased use of alternative fuels.

ENERGY EMERGENCY RESPONSE OBJECTIVE

- make necessary preparations to help ensure the provision of adequate assistance to New Mexico citizens and businesses in the event of an energy emergency.

The ensuing sections of this report discuss ECMD programs and activities aimed at achieving the preceding objectives.

ENERGY EFFICIENCY AND CONSERVATION

OVERVIEW

Energy efficiency and conservation are resources that can lower consumer energy bills and increase the disposable income of New Mexicans. They offer many low-cost options that can be implemented by

Insulation and radiant heating, Highway Department Maintenance Building.

all economic sectors in New Mexico. Energy efficiency and conservation technologies are cost-effective, commercially available, quickly implemented and are an important part of the solutions to our energy needs. Significantly, energy efficiency and conservation technologies generate savings from the date of installation through the useful life of the product.

Sound energy policy recognizes that energy efficiency and conservation are energy resources readily available to virtually every consumer. In many cases energy efficiency and conservation resources save more energy than is measured by a building's utility meters in that there are no transportation/transmission or conversion losses.

There is a difference between energy efficiency and energy conservation. For example, replacing an old inefficient furnace with a new, more efficient furnace is considered an efficiency measure. Similarly, installation of additional insulation in an old home improves the building shell efficiency of a house. Installing a time-clock thermostat is, however, considered an energy conservation measure. With a time-clock thermostat, the temperature can be reduced with no one noticing, while the occupants are away or sleeping, and less energy is consumed. Less energy service was provided by the furnace but it went unnoticed by the occupants. Conservation measures can have no up-front costs if the occupants make a conscious effort (behavioral change) in resetting the existing thermostat when they leave their homes or go to sleep.

Perhaps the biggest and most costly myth in the business world is that energy represents a fixed operating cost. Fortune 500 companies in the energy service industry have made significant profits destroying the myth. Technology-driven energy savings are so predictable and reliable that banks routinely lend money for the purchase of these products, knowing that they will also profit from the energy savings. In New Mexico, energy service companies (ESCOs) have implemented well over $25 million in 36 energy efficiency projects - primarily in public schools and universities, saving over $3.9 million per year. These projects improved the learning environment for students and reduced the operating cost of schools for the taxpayer. Lenders now offer energy efficiency mortgages and relax qualifying requirements based on the understanding that lower monthly energy bills increase homeowner disposable income and improve the probability of making mortgage payments.

In summary:

- Energy efficiency and conservation increases disposable income.
- Energy efficiency and conservation empower users to control energy costs.
- The least expensive energy is that which is not consumed.
- Energy efficiency is the cheapest energy that money can buy.
- Energy conservation can be free with a little human creativity.
- Higher energy consumption creates opportunities for efficiency.
- Businesses that implement efficiency have a competitive edge.

EFFICIENCY PROGRAMS AND ACCOMPLISHMENTS FOR 2003

Energy Conservation and Management Division (ECMD) administers and manages a number of energy efficiency programs in partnership with various private- and public-sector entities. Included are the following:

State Government Energy Management Program

Beginning in 1992 with Executive Order 92-20 and continuing through Executive Orders 96-30 and 99-40, state agencies have been directed to reduce energy consumption and costs in state buildings. To accomplish this directive, the ECMD serves as lead agency and assists state agencies by providing annual ECMD grants for energy efficiency improvements and technical assistance. Result from the last Executive Order showed a 17.5% reduction in energy consumption and approximately $1.2 million in cost savings. ECMD has maintained a utility bill database that is the sole centralized repository for energy expenditures. The database currently contains nearly 1,700 accounts from 30 utilities. Current state utility expenditures total $13.6 million per year, including electricity, natural gas, LP gas, water, sewer and garbage disposal.

Table 1. Public School Construction Plans Reviewed

	FY 00-01	FY 01-02	FY 02-03
Additions (sq. ft.)	650,293	1,362,304	1,391,734
Renovations	1,113,117	2,084,133	1,533,533
Students Served	53,176	62,254	73,293
Total Construction Cost	$139,477,618	$206,750,412	$231,843,373
# of Plans Reviewed	94	103	122

Retrofit projects funded under this program:

- Central NM Correctional Facility: Energy-efficient lighting, $30,482; completed 6/30/03.
- Farm and Ranch Museum: Efficient museum lighting, $3,176; completed 6/30/03.
- Office of Cultural Affairs: Efficient lighting, energy controls, insulation, $45,698; completed 6/30/03.
- Department of Transportation: Insulation and natural gas radiant heating in 5 shops, $31,915; completed 6/30/03.
- Forestry Division (Tree House) Improvements: Insulation, insulated garage door, $10,000; completed 9/30/03.
- Southern NM Correctional Facility: Repair solar field controls and install new Direct Digital Controls system, $13,592; completed 9/30/03.
- Las Vegas Medical Center: Energy-efficient lighting, sensor-operated water faucets and lavatories, $33,000; completed 9/30/03.
- Department of Public Safety: Lighting efficiency improvements, $9,489; completed 6/30/03.
- Ft. Bayard Medical Center: Boiler efficiency improvements, $20,000; completed 12/31/03.

Public School Energy Efficiency

ECMD works with school districts throughout New Mexico in an effort to improve their facilities' energy efficiency, thereby lowering energy costs while making the classroom environment more comfortable and thus conducive to learning. Under an agreement with the State Department of Education, ECMD reviews all school construction plans to ensure compliance with applicable building energy codes and standards. An average of over 100 projects totaling more than $200 million have been reviewed in recent years.

Energy Smart Schools

ECMD is partnering with the Albuquerque Public School (APS) District to initiate an "Energy $mart Schools" project. This project will be a model of high-energy efficiency. The intent is to save energy and money, while also functioning as an on-site educational laboratory for the study of energy efficiency and management. The APS E-school is expected to use 41% less energy by using daylighting instead of electric lights, advanced controls, better insulating windows, efficient mechanized equipment and systems. The federal DOE funded $60,000 of the Energy $mart School Project, with APS providing matching funds of $50,000.

Energy Performance Contract (EPC) Review

ECMD provides review and approval of state/local governments' performance contracts under the Public Facility Energy Efficiency and Water Conservation Act [Sections 6-23-1 to -10, NMSA 1978] to certify that projected savings are reasonable and accurately estimated. ECMD currently has 36 energy performance projects with an estimated annual cost savings of $3.9 million. This year a proposal from City of Albuquerque Housing Services was approved. The project will save $1.4 million in energy and water costs per year in 28 public housing units. In addition, a project for the College of Santa Fe was approved. The project will cost $769,261 and will save $108,879 and enough power for 366 homes. In addition, ECMD continues to work with past EPC participants to resolve problems that may surface in contracts that are still active.

Rebuild America/ Rebuild New Mexico

ECMD continued to provide for operation of the Rebuild America/ Rebuild New Mexico program, a public-private partnership to promote energy efficiency in buildings. Program energy audits have identified potential savings of more than $1,000,000 per year for Rebuild partners. The program offers walk-through audits, energy information and workshops, third-party review of energy proposals and other technical assistance. Such assistance was also provided to 22 tribes and pueblos in New Mexico, with 100,000 square feet of public buildings audited.

One of the biggest success stories involves Rebuild's work with Albuquerque Public Schools (APS). This initiative involves a focus on behavioral energy efficiency procedures at 28 APS schools. Under the program, over $292,000 in energy costs and 3.5 million kilowatt-hours per year have been

Table 2. Energy Efficiency Retrofits: Estimated Fiscal Impact (Dollars In Thousands)

Fiscal Year	General Fund Cost	General Fund Savings	Other Funds Cost	Other Funds Savings	Net Cost/Gain To General Fund	Change In FTE
2004		0	4,000		0	
2005		1,600	4,000		1600	
2006		3,200	4,000		3200	
2007		4,800	4,000		4800	
2008		6,400	4,000		6400	
Total		16,000	20,000		16,000	

saved. In addition, an "Energy Patrol" education-action program was developed, impacting over 600 students, teachers and members of the public. As a result, the National Energy Foundation selected APS' Cleveland Middle School as "School of the Year" in New Mexico.

Building Energy Codes and Standards

ECMD has been working for several years to encourage the Construction Industries Commission (CIC) to upgrade New Mexico's residential and commercial building energy codes. We have secured a sizable ($150,000) federal grant to assist in providing technical analyses and training of builders, contractors and other construction personnel. In addition, ECMD staff provides technical assistance to over 100 builders each year to ensure compliance with energy code requirements. The Energy Policy Act of 1992 (EPACT) [Public Law 102-486] requires states to update building energy codes by July 2004.

PROPOSED EFFICIENCY INITIATIVES

In 2003, ECMD proposed as part of Governor Bill Richardson's *Performance Review—Moving New Mexico Forward* a number of new efficiency initiatives. These initiatives are intended to save taxpayer dollars while enhancing the delivery of constituent services.

Energy Efficiency Retrofit Projects.

Significant energy and cost savings can be achieved through energy efficiency retrofits in buildings. In particular, the opportunities in New Mexico state government are enormous. For example, public schools, universities and Cabinet-level state agencies spent over $75.3 million on utilities in FY 2002, including $51.3 million for electricity, $17.3 million for natural gas, and $2.4 million for liquefied petroleum gas. Similarly, in the year ending June 30, 2003, public schools added over 1.3 million square feet of new space and renovated approximately 1.5 million square feet of existing schools; the value of this construction amounted to $231 million covering 122 projects that year.

Facility managers in all sectors - commercial, industrial and institutional - can initiate pursuit of their most promising opportunities by identifying buildings that have not yet been targeted for energy efficiency practices and technological retrofits. The installation of energy efficient lighting in buildings can reduce lighting energy consumption by as much as 50 percent. Also, installation of appropriate building controls can reduce heating energy consumption by 10% or more by reducing electrical and natural gas consumption during unoccupied periods. Cooling cost savings can also be realized.

To date, much attention has been focused on utilizing New Mexico's Public Facility Energy Efficiency and Water Conservation Act to effect state building energy efficiency retrofits through what is known as "energy performance contracting." This is where an energy efficiency contractor is compensated utilizing the savings in utility costs that the government entity realizes through efficiency projects. Depending on the circumstances, this can be an effective approach—particularly if an agency does not have the up-front capital for a desired project. With energy performance contracting, however, the "net gain" of utility cost savings is not realized until after the contractor has been fully compensated; this can sometimes take 5-10 years.

Given these considerations, ECMD proposed an initiative to enhance the efficiency of state buildings and schools through lighting retrofits and the installation of energy control systems. Under this proposal, state funds would be allocated upfront for the retrofits and in-house labor would be utilized to the maximum extent practicable. As a result, contractor and financing costs are minimized while allowing utility cost savings to accrue to the state general fund from day one of project implementation.

ECMD has proposed that four million square feet of state buildings be retrofitted each year from FYO4 (2003-04) through FYO9 (2008-09) at a total cost of $20 million. While actual savings will begin to accrue immediately in FYO4, no FY04 savings have been included in the table due to the time required to effect the retrofits in the first year. The first full year of system-wide savings (20 million square feet) will occur in FY09 and will generate $8 million per year in savings thereafter. Based on retrofit experience and research, $400,000 per year in utility savings will be realized for every 1 million square feet of space retrofitted at a cost of $1,000,000 (a 2.5-year "pay back" period). The savings are cumulative (*i.e.* retrofit projects

Table 3. Natural Gas Direct Purchases - Estimated Fiscal Impact
(Dollars in Thousands)

Fiscal Year	General Fund Cost	General Fund Savings	Other Funds Cost	Other Funds Savings	Net Cost/Gain To General Fund	Change in FTE
2004	0	$1,210	NA	NA	$1,210	None
2005	0	$1,210			$1,210	
2006	0	$1,210			$1,210	
2007	0	$1,210			$1,210	
2008	0	$1,210			$1,210	
Total	0	$6,050			$6,050	

accomplished in earlier years continue to provide savings in subsequent years).

Natural Gas Purchase Options

Significant savings on natural gas purchases can be realized if all state agencies utilize natural gas marketing price agreements. The Building Services Division (BSD) of the NM General Services Department (GSD) has a natural gas marketing price agreement in place that is working well. After deregulation of the natural gas utility industry, it became possible for consumers to purchase natural gas directly from producers for a substantial cost savings. Savings to state agencies have been proven for utilization of natural gas marketing price agreements. The current state contract allows for three pricing options: 1) Purchase with a guaranteed 7% savings over the tariff price. This option requires a one-year commitment. 2) Purchase natural gas using index pricing at the beginning of each month from the San Juan Basin. Savings vary from month to month. 3) Purchase natural gas using the gas futures market, in packages of three or four months. Purchases are made months in advance. This method offers the greatest potential savings and the greatest potential risk.

Currently, BSD is using a combination of index pricing and negotiated price purchasing to achieve a minimum of 12% savings over PNM pricing. Since the first agreement was put in place in 2001, Cabinet - level state agencies, the City of Albuquerque, and the City of Farmington have saved $142,450 compared to PNM prices. Besides BSD and the cities above, other state entities taking advantage of the price agreement include the Corrections Department, Office of Military Affairs, and the Public Employees Retirement Association. Much larger potential savings are possible if all agencies were directed to use the existing agreement. It should be noted that GSD is not authorized to purchase natural gas for other state agencies.

While there is the potential for greater savings in the latter two options, the guaranteed 7% savings option is risk-free. With NM public schools, institutions of higher education and Cabinet-level state agencies spending over $17 million annually for natural gas, the potential combined savings for all three entities would be at least $1.2 million per year.

Higher Energy Standards for New Buildings

Significant energy cost savings in the construction and future operation of new state facilities can be achieved by requiring that all new state buildings meet or exceed the 90.1-1999 American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) standard or latest version. Federal law (Energy Policy Act of 1992) requires states to update their commercial energy code to the most recently approved U.S. Department of Energy (DOE) code. ASHRAE Standard 90.1-1999 fulfills this mandate. To comply with the mandate, states are required to upgrade their existing commercial building codes by July 15, 2004. Many states have adopted this basic energy standard for all their state building construction. However, New Mexico remains with the 1986 Model Energy Code that is over 17 years old for commercial buildings and is woefully inadequate with respect to energy efficiency.

While it is recognized that energy-efficient retrofits reduce operating costs, many are under the impression that it is more costly to construct an energy efficient (*i.e.*, ASHRAE compliant) building. This is not necessarily the case depending on a variety of factors. Some energy efficiency construction elements increase the cost of construction while others decrease the cost.

Table 4. Higher Energy (ASHRAE) Standards - Estimated Fiscal Impact
(Dollars in Thousands)

Fiscal Year	General Fund Cost	General Fund Savings	Other Funds Cost	Other Funds Savings	Net Cost/Gain To General Fund	Change in FTE
2004		$ 189.80		$ 2,001.00	$ 189.80	None
2005		$ 379.20		$ 2,001.00	$ 379.20	
2006		$ 568.80		$ 2,001.00	$ 568.80	
2007		$ 758.40		$ 2,001.00	$ 758.40	
2008		$ 948.00		$ 2,001.00	$ 948.00	
Total		$ 2,844.00		$ 10,005.00	$ 2,844.00	

Natural gas bus and alternative Transportation — City of Santa Fe.

A DOE study conducted specifically for ECMD concluded that for every one million square feet of public schools constructed to meet the ASHRAE standard, $1.37 million in construction costs are saved. This is because certain energy efficiency measures (passive lighting, reducing the "heat load" of the building) result in lower costs for lighting and heating, ventilation, and air conditioning (HVAC) systems (*e.g.*, fewer light fixtures, fewer chillers for cooling, etc.). Construction costs for higher education facilities are slightly higher with ASHRAE compliance: ~$393,000 per one million square feet. This is because those higher education facilities, unlike public schools construction, are not currently required to incorporate certain energy efficiency measures that increase construction costs. This construction cost increase is comparatively small given that construction costs can average $100 million per million square feet and also recognizing the impressive annual reductions to energy-related operating costs savings ($244,000/year – roughly a 1.5 year "pay back" period).

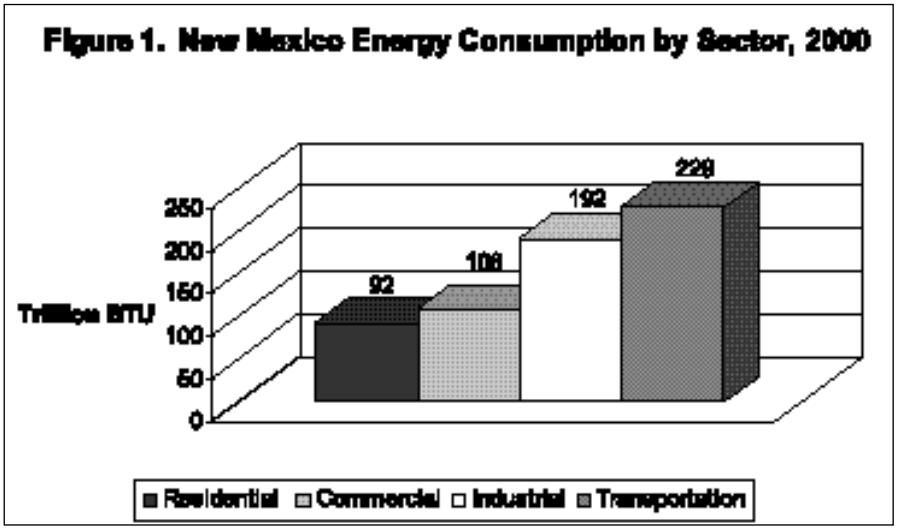
Operating (utility) cost savings for ASHRAE-compliant buildings (versus existing construction standards) are estimated at $103,000/million ft^2/year for public school buildings. For this estimate, 1,500,000 square feet/year of new and renovated construction are assumed. On average, public schools have added 1.0 million square feet over the last 6 years; and, they have renovated an average of 1.2 million square feet per year over the same period. It is estimated that nearly half of the renovated space could benefit from a new energy code. Higher education facilities can realize savings of $244,000/million ft^2/year by incorporating ASHRAE measures into construction. Higher education adds about 150,000 square feet of space per year.

The following table shows the combined fiscal impact for public schools and institutions of higher education.

TRANSPORATION EFFICIENCY AND ALTERNATIVE FUELS

The Energy, Minerals and Natural Resources Department through ECMD promotes the use of alternative fuels and energy efficiency in New Mexico's transportation sector. ECMD manages the Alternative Transportation Program and has established goals to reduce and displace conventional petroleum-based fuel consumption.

Transportation strategies and federal regulations have guided efforts to increase the use of alternative fuels and the use of more efficient, less polluting vehicles. The Clean Air Act of 1970 (amended in 1977 and again in 1990) began the effort to clean up



air pollution; subsequently, the Federal Energy Policy Act of 1992 (EPACT) mandated the accelerated acquisition of alternative fuel vehicles. In 1992, New Mexico enacted legislation now known as the Alternative Fuel Vehicle Acquisition Act [Sections 13-1B-1 to –7, NMSA 1978] and developed an energy policy goal to meet EPACT and State requirements, and to increase use of New Mexico's own abundant energy resources.

Transportation is the largest energy-use sector and a major source of air pollution in New Mexico. While the transportation sector accounts for 28% of the energy consumed in the United States, New Mexico's energy consumption comes in at 36% of the total energy used. The U.S. Department of Energy's Energy Information Administration (EIA) reports that in 2000, New Mexico's energy consumption exceeded 621 trillion BTUs and the transportation sector accounted for 229 trillion of the total. Petroleum fuel is the major fuel source for New Mexico's transportation sector, accounting for 80% of the energy used.

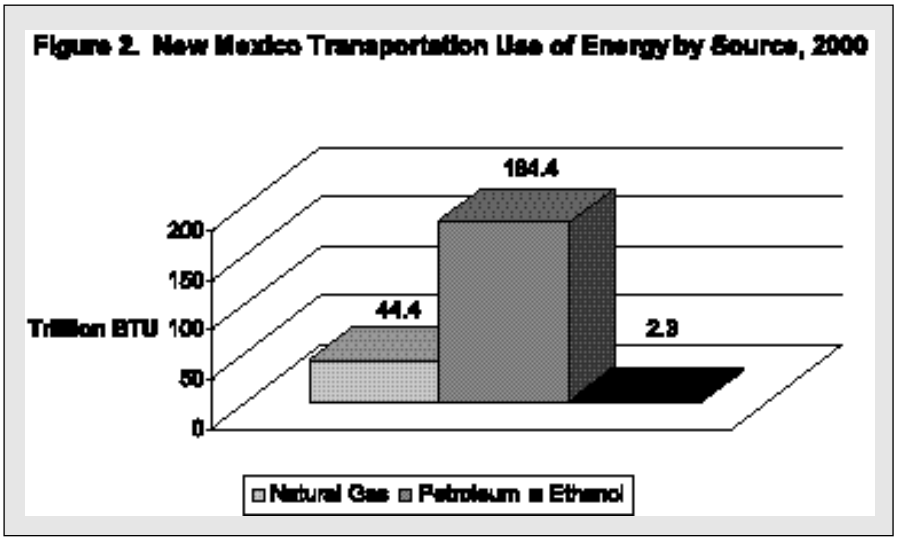
The use of petroleum products in the national transportation sector alone exceeds total domestic oil production by 2 million barrels per day and is projected to triple by the year 2010. Fossil fuel use in transportation is a focal point of both environmental and energy concerns. Using petroleum for transportation has implications for our health, environment and energy security. Transportation influences the lives of all citizens as it affects national security, quality of the environment, links to other people and places, economic well-being, safety, and access to educational and social activities. Safe and efficient transportation supports the freedom, opportunity and air quality that all citizens value.

There are options to reducing our reliance on foreign sources of petroleum. One option is to use alternative fuels; another is to use fuels more efficiently by purchasing fuel-efficient vehicles and ridesharing. There are a variety of fuels that fall under the alternative fuel definition, including natural gas (both compressed and liquefied), liquefied petroleum gas (propane), ethanol (E85), electricity, hydrogen and biodiesel. New Mexico currently ranks second in natural gas production and third in reserves in the continental United States, and is home to an ethanol production plant, and has great potential to promote the use of other alternative fuels including biodiesel and hydrogen.

Hydrogen is currently identified as an alternative fuel under the New Mexico Alternative Fuel Vehicle Acquisition Act and as a renewable energy if derived from non-fossil fuels under the Renewable Energy Portfolio Standard [Section 17.9.573 New Mexico Administrative Code; www.nmcpr.state.nm.us/nmac/] and the Renewable Energy Production Tax Credit [Section 7-2A-19, NMSA 1978].

In an effort to establish New Mexico as the first hydrogen economy in the nation, an alliance known as the Hydrogen Technology Partnership (HyTeP) was formed consisting of representatives from industry, business, research laboratories, academia and government to work together to enhance economic development in New Mexico through a cooperative focus on hydrogen and fuel cell research, development, demonstration and commercialization. The state is building upon some 25 years of research both at Los Alamos National Laboratory and the NASA Johnson Space Center-White Sands Test Facility. In addition to hydrogen and fuel cell research, the state of New Mexico has an abundance of both renewable and non-renewable resources from which to produce hydrogen. The state ranks 2nd in production and 3rd in known reserves of natural gas, 2nd in solar energy resources, 12th in wind potential, and a yet-to-be-determined amount of biomass resources derived from agricultural, forest, and non-hazardous municipal solid waste streams.

Hydrogen is viewed by many as a clean fuel or clean energy carrier because it does not produce harmful CO_2 emissions when burned and its only byproducts are heat and pure water. Although the most abundant element in the universe,



hydrogen rarely occurs as a free-standing element in nature, but rather must be extracted from water or hydrocarbons. The most common and cost-effective means of generating hydrogen today is through steam reforming of natural gas. However, the long-term goal is to produce hydrogen from renewable sources such as biomass or the electrolysis of water using solar and wind. By combining hydrogen with fuel cells, one may generate, store and achieve a high level of efficiency while using clean energy.

There are several applications for hydrogen and hydrogen fuel cells. The three primary applications are: portable, stationary and automotive. The state of New Mexico is currently evaluating the potential for each of these application areas. Several demonstration projects are currently under development to test and evaluate these technology applications. One such project proposes to build upon current compressed natural gas refueling infrastructure to provide hydrogen refueling for demonstration vehicles while supporting the alternative fuel initiatives currently underway in the state. Excess hydrogen would be used within a stationary fuel cell to provide back-up power or onsite electrical generation and storage. Other planned projects would utilize the state's existing wind energy facilities to demonstrate the production of hydrogen using renewables.

Table 5. Acquisition of State Alternative Fuel Vehicles (AFVs)

Model Year Reported	Number of AFVs
2003	365
2002	145
2001	280
2000	111

ECMD's strategy to assist and encourage the use of alternative fuels and to facilitate compliance with state and federal mandates is being accomplished through securing federal U.S. Department of Energy Special Project funding and through the State Energy Transportation Program. The outcomes of the federally funded projects are to:

•Develop an Ethanol (E-85) and Biodiesel (B-20) fueling station infrastructure in New Mexico to serve existing federal and state E-85 fleets and to provide biodiesel to diesel vehicle fleets;

•Develop publicly accessible compressed natural gas (CNG) fueling stations in New Mexico including Las Cruces, Las Vegas, Socorro, Santa Fe and Albuquerque;

•Purchase and retrofit compressed natural gas (CNG) school buses for New Mexico schools;

•Create a support system for alternative fuel use through an established alternative fuel and pollution training curriculum within the Santa Fe Community College;

•Facilitate compliance with federal and state mandates requiring purchase of alternative fuel vehicles for State fleets.

Efforts to increase public and government agency awareness of alternative fuels have included an annual Alternative Fuels Day at the New Mexico State Fair (Expo New Mexico), attendance at environmental, transportation and other related workshops and conferences, and on-site visits with government fleet operators. ECMD was recently awarded grants by the U.S. Department of Energy to support the ongoing work of the Land of Enchantment Clean Cities Coalition and to provide universal card readers at E-85 stations as well as a series of videos, public service announcements and print media regarding the availability and benefits of using E-85.

The key to alternative fuel infrastructure development is fleet growth and fuel usage. New Mexico school districts and transit agencies that use compressed natural gas to fuel fleet vehicles assist in the effort to build New Mexico's alternative fuel infrastructure.

New Mexico's acquisition of alternative fuel vehicles is facilitated by the increased availability of alternative fuel vehicles from automobile manufacturers; many new models are being introduced into the vehicle market including ethanol flex-fuel vehicles, and gas-electric hybrid vehicles.

To reduce petroleum fuel consumption and traffic congestion, and to help improve air quality, ECMD provides support and funding to develop rideshare programs that encourage commuters to use carpools, vanpools, public transportation, and park-and-ride systems to get to their destinations. The ridesharing and park-and-ride activities have shown significant fuel cost savings, reduced vehicle-miles traveled and displaced 3.5 million gallons of gasoline in a one-year period (FY2003), as indicated in Table 6.

Table 6. Fuel Savings

Agency	Reduced vehicle-miles traveled	Number of gallons of fuel displaced	Estimated fuel cost savings
Las Cruces Rideshare	41,463,800 miles	3,488,150	$5,404,274
ABQ Balloon Fiesta	960,239 miles	13,727	$20,590

RENEWABLE ENERGY RESOURCES

Renewable energy sources, including solar, wind, hydropower, biomass, and geothermal, currently provide less than 1% (or 5.6 trillion BTUs) of New Mexico's annual energy needs. The contribution of renewable energy has dropped from 6.6 trillion BTUs reported in 1997. This is contrary to the fact that our renewable energy resource base is very large and diverse. Table 7 provides a breakdown of consumption, by sector, for renewable energy in New Mexico.

Table 8 shows the most currently available data on production from renewable energy sources in New Mexico. The estimated value of this production is $46.5 million. The data shown does not include production from wind power development completed in 2003.

A significant amount of renewable energy research, development and demonstration (RD&D) activity in New Mexico occurs through federal government programs at Sandia National Laboratories (SNL). At the time this was written, federal government funds were not yet appropriated, but SNL funding for solar thermal systems and buildings in FY 2003 is estimated to be $3-4 million and the photovoltaics program is expected to receive $5 million. In other renewable energy RD&D areas, the previous FY 2002 appropriations were: energy storage at $6.5 million; geothermal drilling technology at $6.4 million; wind at $3.9 million; and biopower electricity at $1.1 million.

Table 7. Renewable Energy Consumption In New Mexico, 1999

Sector	Energy Source	Trillion BTUs Consumed
Residential	Solar	0.5
	Wood	3.4
Commercial	Geothermal	0.1
	Wood	0.5
Industrial	Geothermal, Wind, and Solar	0.6
	Wood and Waste	0.5
Total		5.6

Source: DOE/EIA State Energy Data Report 1999, printed May 2001.

Table 8. Renewable Energy Production by Resource, 1999

Resource	Billion BTUs Produced	Value ($ Millions)
Fuel Wood	3,500	6.5 (Note 1)
Alcohol Fuels	1,179	23.3 (Note 2)
Hydroelectric	786	15.2 (Note 3)
Geothermal	407	1.4 (Note 4)
Wind	6	0.119 (Note 5)
Total	5,877	46.51

Notes:
1. DOE/EIA Energy Price and Expenditure Report, 1999.
2. Data from High Plains Ethanol Plant, Portales, NM; 15 million gal/yr @ $1.559 per gallon.
3. Edison Electric Institute, Yearbook 2000; value based on average NM electricity cost of $0.0663/kWh.
4. Southwest Technology Development Institute, NMSU; average NM natural gas cost of $3.62/million BTU.
5. Southwestern Public Service, Amarillo, TX; Clovis, New Mexico wind turbine, average NM electric price.

SOLAR

Overview

The position of New Mexico as a leader in solar energy in the 1970s and 1980s attracted private, state, and federal funding, resulting in significant benefits to New Mexico and the nation. Funding has fluctuated since that time. Many solar pioneers of the private sector have survived, evolved, and continued forward to provide innovative products and services to the state and the world. ECMD has been involved in most state-funded solar programs and continues, along with the NMSU Southwest Technology Development Institute, to be a primary contact where the state is involved.

At federal laboratories in New Mexico, research funding for solar technologies was dropped at Los Alamos National Laboratory and has decreased at SNL. SNL conducts a wide range of solar energy research, development, and demonstration (RD&D) projects involving technologies such as solar thermal concentrating collectors, photovoltaic (PV) system components, solar buildings, and manufacturing. The new mission of enhanced U.S. energy security, or "energy surety," appears to have led to increased emphasis at federal laboratories for most types of domestic energy RD&D, including solar energy. Energy surety includes design of "microgrids" for essential facilities. Solar energy could be utilized to provide a portion of the secure energy needed after a disaster disables conventional delivery infrastructure.

The solar industry is composed of manufacturers, equipment suppliers, greenhouse and glazing suppliers, passive solar builders, installers, and service companies. Most

businesses marketing solar technologies are members of the New Mexico Solar Energy Association (NMSEA) and/or the New Mexico Solar Energy Industriy Association (NMSEIA). In NMSEA's *Directory of Solar Professionals*, 30 architects and designers, 42 builders, 6 education professionals, 4 engineers, 3 financing institutions, 43 solar technology companies, 6 greenhouse designers and builders, and 25 green building product and service companies are listed. NMSEA's resources can be accessed at www.nmsea.org or 1-888-886-6765.

Table 9. Average Solar Radiation In New Mexico

	BTUs/SQUARE FOOT/DAY	
AREA	HORIZONTAL SURFACE	VERTICAL SURFACE
Albuquerque	1,827	1,423
Carlsbad	1,825	1,210
Chama	1,560	1,200
Las Cruces (El Paso)	1,900	1,380
Las Vegas	1,675	1,250
Lordsburg	1,900	1,275
Los Alamos	1,536	1,262
Santa Fe	1,825	1,210
Taos	1,575	1,200
AVERAGE	1,755	1,297

Source: Los Alamos Scientific Laboratory, USDOE, *Passive Solar Design Handbook*, Vol. 2, 1980; and *New Mexico Climate Manual, Solar and Weather Data*, New Mexico Energy Research and Development Institute 2-72-4523, 1985.

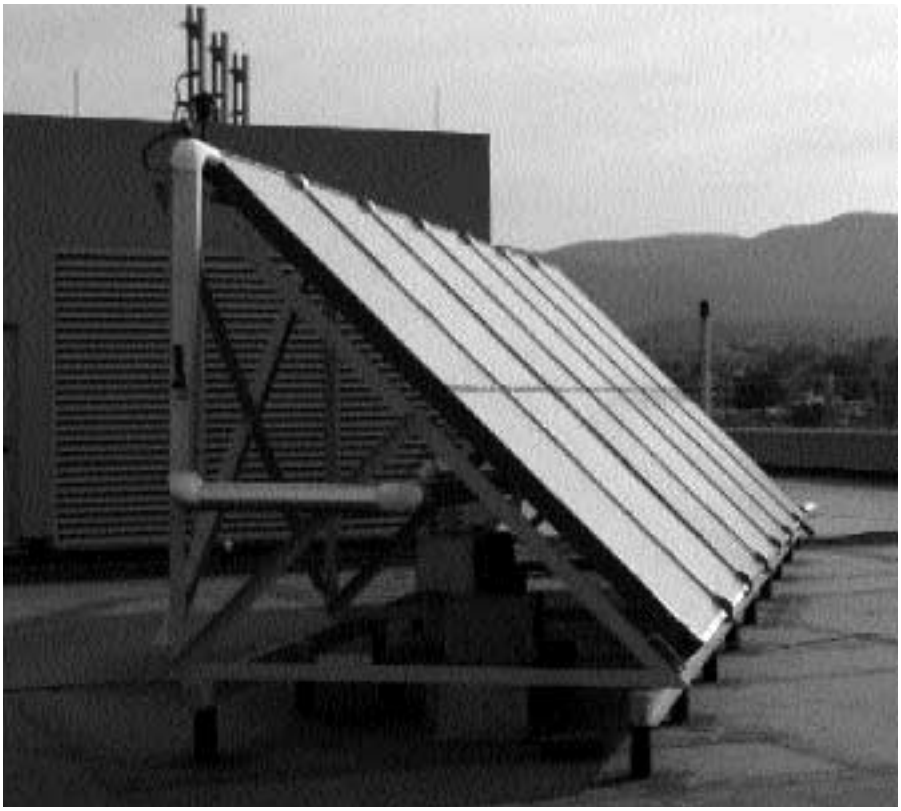
In the 1980s there existed both federal and state solar tax credits. During that decade over 40,000 active and passive solar systems were installed in New Mexico. When oil prices fell and the federal tax credit for use of solar was eliminated in December 1985, the impact on the solar energy industry was immediate. At the beginning of 1985, approximately 250 solar businesses were in operation employing about 2,000 people. By the end of 1985 about 80% of these businesses had closed. However, in recent years there appears to be increased activity for solar businesses in New Mexico, due to increased interest in PV systems. A solar and wind tax credit bill (S.B. 348) was proposed in the 2003 Regular Session of the New Mexico State Legislature, but did not pass.

The Solar Rights Act of 1978 allows property owners to create solar easements for the purpose of protecting and maintaining proper access to sunlight. It also includes provisions allowing local governments to create their own ordinances or zoning rules pertaining to protection of solar rights. New Mexico was first among the 50 states to enact a solar access law and also implement tax incentives for solar systems.

Resources

Energy from the sun is an enormous, albeit intermittent, energy source. Solar energy resources are available at high levels uniformly throughout New Mexico and sunshine is experienced more than 3,200 hours per year. This results in a range of solar energy on a horizontal surface—depending on location and season—of about 900 to 2600 BTUs per square foot per day (3 to 8 kilowatt-hours (kWh) per square meter per day).

The potential for converting solar energy to electricity and heat in New Mexico with existing and emerging technologies is also great. The state's average daily energy consumption is about 904 billion BTUs (265 million kWh) or 161,425 barrels of crude oil, which could also be collected as solar energy within an 18 square-mile area.



Solar domestic hot water system at Montoya Building, South Capital Complex in Santa Fe, with 290-square-foot collector array.

Table 9 presents the average solar radiation for selected New Mexico communities.

Production

Direct use of the sun's light and thermal energy has long been recognized in New Mexico. Over $4 million worth of energy was supplied by active and passive solar systems in 1990, by system types such as solar water heating, solar thermal space heating, and PV. As an example, a PV collector array the size of a football field would directly produce 1.2 million kilowatt-hours of electricity per year, or the electricity needed to power about 122 homes. Assuming a conservative retail electricity cost of five cents per kilowatt-hour, this PV system could offset $500 per year in utility costs for each home.

Although less than five percent of the solar installations in New Mexico generate electricity, PV systems include a 47-kilowatt array at the Southwest Regional Experiment Station at New Mexico State University in Las Cruces, operated by Southwest Technology Development Institute (SWTDI); and upwards of 250 one-kW irrigation units in various areas. SNL estimated that there were approximately 2,000 PV systems in New Mexico in 1990.

Electric utilities in the state are required to provide information on alternative energy systems to remote customers with less than a 25-kW load who request line extensions. This requirement applies when the cost of the requested line extension is greater than 15 times the estimated annual revenue from the line extension. In such cases, utilities must provide customers with information on suppliers of alternative energy systems.

Grid-interconnected photovoltaic system at Rio Grande High School, Albuquerque, with 1-kW DC power input array; Contractor is Sacred Power.

Another type of solar energy production is commonly provided in New Mexico through innovative architecture in buildings: passive solar design. Following design guidelines published by the National Renewable Energy Laboratory (NREL), it is possible for strategic placement of windows, sunspaces, thermal storage walls, and mass (e.g., concrete, brick, adobe), as well as appropriate orientation and insulation, to enable the sun to provide up to 80% of a home's annual space heating needs in New Mexico. This can be achieved without compromising cooling needs. The sun can also be utilized to integrate daylighting, thereby offsetting electricity costs associated with lighting. Passive solar design is also applied to commercial buildings and schools in New Mexico.

By integrating passive solar design, solar water heating, and PV in residential home design it is conceivable to greatly reduce or eliminate the need for conventional electricity, heating, and cooling energy sources. Many success stories exist in New Mexico of living "off-grid." As noted above, solar professionals resident in New Mexico are available for design assistance.

Recent Developments

Significant activities have been conducted with solar energy in New Mexico over the past few years. ECMD has implemented major projects that use our extensive solar resource. ECMD each year provides public information and educational activities on solar energy at various conferences, workshops, and other venues, including the *Taos Solar*

Festival, New Mexico State Fair, and the New Mexico Solar Energy Association's *Solar Fiesta*.

ECMD is refocusing its solar program to feature demonstrations of solar water heating and PV systems. Demonstrations of solar water heating and PV systems will be sited at public school facilities in several New Mexico climate zones. In 2003 ECMD launched the *Schools with Sol* Solar Demonstration Program and selected the following school districts as participants: Albuquerque, Truth or Consequences, Roy, Questa, Jal, Reserve, Santa Fe, Grady, and Alamogordo. ECMD has allocated $100,000 in 2003 for this program. To date, the program has assisted in the installation of a 2.6-kW PV system at Sandia Mountain Natural History Center and a 1-kW PV system at Rio Grande High School (Albuquerque). Both of these systems are interconnected with the utility grid operated by Public Service Company of New Mexico (PNM). The demonstrations are intended to educate and involve students, faculty, staff, and communities at public schools; collect system performance data in different New Mexico climate zones; evaluate incentives for solar technology applications; and address related issues such as state agency administration of residential tax credits, system certification, and system monitoring. ECMD is collaborating with schools, utilities, other state agencies, solar contractors, manufacturers, DOE, SNL, and NREL to make this program work.

ECMD is also collaborating with NMSEA, Southwest Research and Information Center, and other organizations to finance and install PV systems for low-income communities without electricity service. Several large areas in New Mexico, such as the Pajarito Mesa west of the City of Albuquerque, remain without utility-provided electricity, but could be served with PV technologies. Similarly, electricity service is not available to 37% of households on the Navajo Reservation, 5% of the Jicarilla Apache Reservation, 3% of Zuni Pueblo, and 2% of Acoma Pueblo. The majority of households in unincorporated Colonias communities along the border with Mexico are also without electricity service. These communities often resort to expensive means of producing their own electricity, using power sources such as diesel generators and car batteries. PV systems could be a cleaner and possibly less expensive alternative for the critical needs of lighting and operating simple appliances.

ECMD provided funding to the All-Indian Pueblo Council to install an 11-kW PV carport at the Indian Pueblo Cultural Center in Albuquerque. This 1999 installation is the largest commercial PV array in the state and the largest PV system on Indian lands. It is expected to produce 25,000 kWh of electricity, save 43 tons of coal, conserve 1 million gallons of water, and reduce carbon dioxide emissions by 27 tons per year. The system will save the Cultural Center over $3,400 per year in electricity costs. The carport also provides shade for 11 parking spaces and will be visible to 400,000 visitors annually. In 2003 the installation was removed temporarily for another IPCC construction project, but will be relocated at the site in 2004.

In September 1999, the New Mexico Public Regulation Commission (PRC) issued a rule requiring all utilities regulated by the PRC to offer net metering for cogeneration facilities and small power producers with systems of 10 kW or less. [Section 17.10.571, New Mexico Administrative Code; www.nmcpr.state.nm.us/nmac/] Municipal utilities are exempt because they are not regulated by the PRC. There is no statewide cap on the number of systems eligible for net metering.

The use of solar energy in our New Mexico State Parks has improved their safety and convenience. ECMD installed 29 PV lighting systems at visitor centers, pay stations, and other locations in 15 State Parks. Also, a PV aeration system was installed in a pond at the Rio Grande Nature Center to create better conditions for aquatic life.

It should also be noted that older systems installed in the early 1980s at state facilities have been kept operational. ECMD made improvements in the 1990s to both 16,000-square-foot solar water heating systems at the Central and Southern New Mexico Correctional Facilities. ECMD is currently assisting these facilities with further improvements. The Northern New Mexico Community College also received ECMD assistance to reactivate solar air heating systems on two major campus buildings. In the 1990s, the General Services Department reactivated a 290-square-foot solar water heating system at the Montoya Building in Santa Fe, which provides most of the domestic hot water needs in that building.

ECMD, SWTDI, and PNM are collaborating on a study of "islanding" on the utility grid. This is a condition where the utility grid experiences reverse transmission flow due to independent power production by a customer, which is associated closely with PV systems interconnected with the utility grid. The database produced will greatly assist utility engineers and PV system designers to better understand these conditions. In 2003 DOE awarded ECMD $223,000 for this project through a competitive process.

WIND

Overview

Wind is a proven, cost-effective, and environmentally attractive source of power. Recent technological innovations in wind turbine design have resulted in increased effectiveness and reduced cost. The cost of electricity from wind power plants has dropped to about 3 cents per kilowatt-hour (kWh), very close to the cost of power from fossil-fuel sources. Public utilities across the country and around the world are beginning to include wind in their mix of energy sources.

Wind Power Plant in New Mexico

In July 2003 the first commercial-size wind power plant in New Mexico commenced operation. Known as the New Mexico Wind Energy Center, it is 204 megawatts in capacity, the third largest wind power plant in the world. It is located in eastern New Mexico, about 20 miles northeast of Fort Sumner, in Quay and De Baca counties. The wind power plant is owned and operated by FPL Energy and all the electricity is purchased by PNM.

PNM has instituted a "green tariff" program that allows interested customers to buy wind-generated electricity for a small monthly premium. Any power from the facility not directed toward the residential and business customer subscription program would be sold on the wholesale market, either within New Mexico or outside the state.

PNM sees the power produced by this facility as a way to recognize and respond to interest within New Mexico in renewable energy and to strengthen the company's wholesale generation portfolio for years to come. When PNM plans a new facility or commits to buying power from a new facility, it looks not just at current economic conditions but also at conditions that may exist several years down the road.

Energy produced at the New Mexico Wind Energy Center will likely replace an equivalent amount of power coming from facilities powered by fossil fuels, since the majority of power on the grid does come from fossil-fuel sources. The addition of energy from the New Mexico Wind Energy Center changes PNM's generation portfolio. Wind now comprises 8 percent of PNM's overall generation capacity, which is the portfolio's peak potential output. However, because of the intermittent nature of wind, the facility's output is expected to comprise about 4 percent of the energy actually produced by or for PNM over the course of a given year.

The energy center will bring more than $40 million into rural De Baca and Quay counties over 25 years. This includes $450,000 per year in payments in lieu of taxes to be made to the county governments and school districts; about $550,000 per year in lease payments to landowners; and an estimated $500,000 in salaries for the permanent jobs to be created.

Resource Assessment

The Energy Conservation and Management Division, through its Wind Power Program, has performed a critical role in the development of wind power in the state. In particular, the data ECMD provided to FPL Energy and PNM was very valuable to the development of the recently announced 204 megawatt project described above. ECMD continued data collection at Frio Draw for a third year upon request to assist FPL Energy in their evaluation of potential sites.

ECMD's Wind Power Program is continuing detailed wind energy resource assessment in order to promote further commercial development. In partnership with the National Renewable Energy Laboratory, ECMD contracted to have TrueWind Solutions, LLC produce a high resolution (200 meters) wind map of the state

New Mexico Wind Energy Center near Fort Sumner: 137 turbines, 320 feet high, 204 megawatts. Photo by: Michael McDiarmid

using the latest techniques. The map was completed and delivered in June 2003. The high resolution allows assessment of wind over detailed terrain features. Maps of wind speed are available at heights of 30, 50, 70 and 100 meters. A wind power map is available at 50 meters. The map is interactive with many GIS layers.

The potential for electricity generation from wind is enormous in some areas of New Mexico, especially on the eastern plains. New Mexico ranks twelfth in wind electric potential and is among twelve states in the midsection of the country that, together, have 90% of the total commercial wind electric potential in the contiguous United States. The annual wind energy potential of New Mexico has been estimated to be 435 billion kWh. New Mexico has the potential to produce many times its own electrical consumption, which puts it in a position to export wind electric power.

ECMD's Wind Power Program has provided detailed wind resource assessments of the state and high quality wind data to 33 wind power developers, PNM, land owners and others. ECMD has provided two years of wind speed data collected at six promising sites. Three years of data have been provided at two of the those sites. Monitoring of an additional seventh site on Argonne Mesa, southwest of Santa Rosa, was commenced in August, 2002. Such data are vital to commercial development of wind power plants because they allow accurate estimates of power plant production. Several developers are actively working to develop projects in New Mexico. In August 2003 Excel Energy and Cielo Wind Power announced plans to develop an 80 MW wind power plant in New Mexico on the Caprock south of Tucumcari. The plans depend upon renewal of the Federal wind energy production tax credit.

ECMD'S Wind Power Program has provided studies of the potential economic benefits of wind power to five counties: Eddy, Otero, Quay, Lea, and Colfax. Reports have been presented to these counties. In 2002 the program has completed development the following products:

- New Mexico Wind Power Plant Site Screening Model
- Guidelines for Developers and Investors Interested in Wind Power in New Mexico
- New Mexico Wind Development Handbook
- Mesa Redonda Case Study Report. This study includes: environmental, archeological, cost estimating, transmission, permitting, geotechnical, micro siting, production, and visual.

Policy

In the 2002 legislative session, legislation was passed to provide incentives for renewable energy production. The Renewable Energy Production Tax Credit provides for a credit of one cent per kwh for eligible power plants with capacity of at least 10 MW. The legislation directs EMNRD to administer the provisions and certify eligible power plants. ECMD staff has developed the necessary rules to administer the tax credit and has processed two applications for the credit. Legislation was also passed to allow power plants to utilize industrial revenues bonds and to exempt certain wind power plant equipment from gross receipts tax.

In 2002 the New Mexico Public Regulation Commission (PRC) continued hearings and workshops on their proposed rulemaking to require electricity providers to include renewable energy as a resource. The Commission issued a final rule that requires 10% renewable energy by the year 2011 with intermediate requirements. The PRC rule also requires utilities to offer an optional green power tariff so that those customers willing to pay more for renewable power will be able to purchase larger amounts of renewable power.

Research

Sandia National Laboratories conducts an ongoing wind energy research program that employs a multifaceted approach to the development of economical wind systems for power generation. First, it conducts applied research in aerodynamics, structural dynamics, fatigue, materials, manufacturing, controls, and systems integration to understand unsolved technology problems and to provide better design tools. A major new effort in applied research is the investigation of rare atmospheric events that significantly impact wind turbine long-term structural integrity. Second, Sandia applies its analytical and experimental capabilities to solve specific industry technical problems that are impeding the deployment of reliable, cost-effective solutions for domestic and international markets. Finally, advanced manufacturing techniques are being used to reduce cost and increase reliability of wind turbine blades. Follow-on efforts will consider the complete product life cycle, with emphasis on fully integrated design, agility, and tools to support a design-for-manufacturing process. In all three approaches, Sandia uses formal and informal teaming arrangements to work closely with wind turbine manufacturers, wind farm developers/operators and other DOE laboratories.

BIOENERGY

Introduction

Bioenergy is produced from biomass, which is defined as organic matter including but not limited to agriculture or animal waste, small diameter timber, salt cedar and other phreatophyte or woody vegetation removed from river basins or watersheds, landfill gas and anaerobically digested waste biomass. Biomass feedstock may be either produced or harvested explicitly for such use as grain milo and firewood, or may be a waste stream from agricultural, municipal or industrial sources. Access to and transportation of biomass resources are critical to the economical use of bioenergy. For this reason the creation of bioenergy is often found at the point of availability of a waste stream with a facility's size determined by that stream.

Wood burning for heating is perhaps the most traditional use of bioenergy in New Mexico and continues to be the largest use. Another less common use of bioenergy in New Mexico involves the production of methane from municipal wastewater sludge. This fuel is then burned to heat the digestion process and in some cases to also generate electricity for operation of the plant. Production of fuel alcohol is covered in another section of this report.

Resources and Production

New Mexico possesses an abundance of biomass resources that may be used in the production of energy and other high value products and fuels. Resources include forest thinnings from federal, state and private lands, agricultural crops, animal manure, and non-hazardous municipal solid waste.

Use of forest products as fuel is probably the most common use of bioenergy in New Mexico. The best available research on New Mexico fuel wood indicates that 197,000 cords were harvested in 1986, which is neither a significant drain on the growing stock inventory nor a competitor with the timber products industry. This is equivalent to about 3.6×10^{12} British Thermal Units (Btu).

An assessment of forest material was conducted under a grant from the U.S. Forest Service utilizing data from 1994-1998 of timber supply on state and private land within 14 counties in New Mexico (divided between two regions). Assuming that small diameter, cull wood and whole trees (bark and needles) could be utilized in bioenergy plants, it was determined that Region 1 could sustain approximately 2,679 oven-dry tons of small-diameter material annually, and Region 2 could sustain approximately 32,184 oven-dry tons annually.

In addition, New Mexico ranks first in the nation in average dairy herd size, with 170 dairies throughout the state. There are approximately 300,000 cows at the dairies which produce approximately 2.6 million dry tons of manure per year.

Albuquerque and Las Cruces are using the anaerobic digestion of municipal wastewater sludge to generate methane gas. The gas then fuels the production of electricity and heat to power the wastewater facilities. Los Alamos and Carlsbad are using the resulting methane to heat the digesting process and/or water. Historically, sawmills have burned waste wood to provide heat for wood drying kilns.

The waste stream bioenergy resource in New Mexico has been studied in detail. The total potential for energy production in this sector is large, at 35 trillion Btu per year, although a large share of this resource can be diverted to other uses such as particleboard manufacture. The largest sources in this sector are sawmill/ wood product waste and municipal solid waste.

Recent Developments

Recognizing the growing interest in biomass in the state, EMNRD convened the Biomass Industry Development Working Group, which brought together private industry, federal, state, and local government, tribal, national laboratories and academia to develop a coordination process to encourage and assist in the development of a viable biomass industry in New Mexico, resulting in improved forest health and increased use of domestic biomass resources to stimulate economic development. This process will include assessing opportunities, current projects, end products (biofuels, biopower and bioproducts), supply, technologies, incentives, barriers, funding and economics. As a result of the Working Group, a website has been established to provide access to biomass resource assessments and key contacts from around the state. In addition, the group has formed three subgroups to work on feedstock assessments, legislative/regulatory issues and market development.

In addition, the EMNRD was awarded a two-year grant by the Department of Energy, Office of Industrial Technologies to implement the Industries of the Future Program in New Mexico. One of the two focus industries selected was the forest products industry. The goal of the program is to identify and implement energy efficiency and pollution prevention

solutions in collaboration with the industrial sector. The Industries of the Future Program is working closely with existing forest product businesses (sawmills, furniture manufacturers, construction material manufacturers, etc.) to consider the use of bioenergy within their operations thereby achieving energy efficiency and reducing their overall waste stream.

There are currently two bioenergy projects in New Mexico that use forest thinnings. One of the projects is located in Glencoe, New Mexico and the other at Zuni Pueblo. Both projects are using wood chips in small-scale bio-power units to produce heat and power. Both projects are in the demonstration phase and will assist in fast-tracking the technology to commercialization.

Rapid growth of the New Mexico dairy industry has created a large manure resource in New Mexico. The State of New Mexico and New Mexico State University are working with the U.S. Department of Energy and the Dairy Producers of New Mexico on a research feasibility project to create electricity and heat from this resource.

Biomass is recognized in both the Renewable Energy Portfolio Standard Rule and the New Mexico Renewable Energy Production Tax Credit as a source of renewable energy.

GEOTHERMAL

Overview

New Mexico has significant low-temperature geothermal resources—less than 90 degrees Celsius (C) or 194 degrees Fahrenheit (F)—along its western border and in close proximity to the Rio Grande from north to south. Common low-temperature applications are space heating and water heating. Our state is also blessed with considerable moderate-temperature resources—90 to 180 degrees C (194 to 356 degrees F)—including those in the Rincon area of Dona Ana County and near Cotton City in Hidalgo County. The table below provides a summary of geothermal applications in New Mexico.

In FY 2000-01, DOE directly funded a number of private-sector resource assessment and demonstration projects in southern New Mexico, which are now getting underway.

Production and Use

Geothermal resources in New Mexico have been used directly in a significant manner for over 20 years. In the 1980s, a large district heating system was installed at New Mexico State University (NMSU) in Las Cruces and the largest geothermal greenhouses in the nation were constructed in Dona Ana and Hidalgo counties. A key factor responsible for encouraging the development and use of geothermal energy at that time was a $600,000 appropriation from the New Mexico State Legislature for geothermal research, development, and demonstration (RD&D) projects. ECMD, with substantial technical assistance from the Southwest Technology Development Institute (SWTDI) at NMSU, established and implemented the geothermal RD&D projects. Subsequently, SWTDI constructed a geothermal greenhouse research and business incubator facility in Las Cruces, as well as a geothermal aquaculture facility co-located on site. As a direct result of these efforts, four commercial greenhouses totaling over 30 acres have been established in southern New Mexico. SWTDI

Table 10. New Mexico Geothermal Applications

Sources: Geothermal Energy Association geo@geo-energy.org

SITE	T (°F)	FLOW (GPM)	ENERGY 109 BTUs/YR	APPLICATION
Catron County	NA	NA	NA	Resort & Spas—Bubbles Hot Springs
Dona Ana County: Las Cruces area	142	417	45.9	District Heating (NMSU)
	148	50	1.8	Greenhouse—SWTDI (NMSU)
	148	700	27.6	Greenhouse—J & K Growers
Radium Springs	160	2600	119	Greenhouse—2nd largest nationally Masson Farm
Hidalgo County: Cotton City	245	2000	209	Greenhouse—Largest nationally Burgett Floral
	185	NA	0.7	Greenhouses/Aquaculture—McCants/AmeriCulture
Rio Arriba County	115	80	2	Resorts & Spas—Ojo Caliente
Sandoval County	NA	NA	NA	Resorts & Spas—McCauley Hot Springs, Jemez Springs Bathhouse
	185	40	1.3	Space Heating—Jemez Springs Fire Department
Sierra County	113	NA	NA	Resorts & Spas—Truth or Consequences
	Total		407.3	

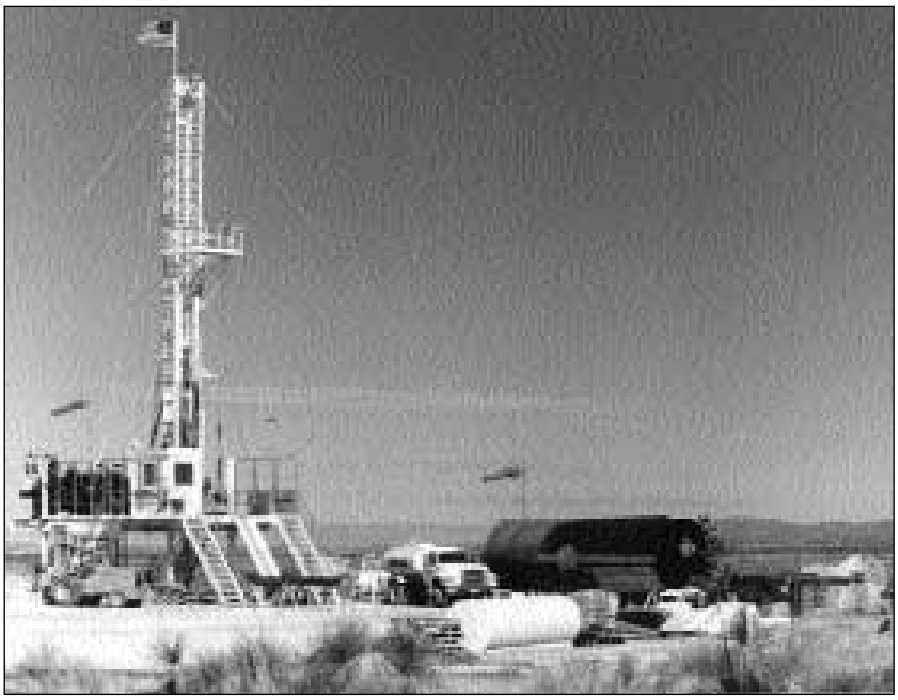
estimates that these four geothermally heated greenhouses represent a capital investment of more than $10 million, generating at least $14 million in annual sales and about 270 jobs.

One of the largest geothermal aquaculture facilities in the nation is also located in New Mexico, in the Animas Valley south of Lordsburg. This facility is owned and operated by AmeriCulture, Inc. Table 10 provides information on the various direct-use geothermal applications in New Mexico, totaling more than 400,000 million BTUs per year of heat.

Large commercial-scale power plants of 1 megawatt (MW) or greater can generate electricity utilizing high-temperature geothermal resources—greater than 180 degrees C (356 degrees F)—but to date have not been constructed in the state. A geothermal resource adequate for supporting such a power plant is located in the Valles Caldera area in the Jemez Mountains. With geothermal binary power plants now able to utilize moderate-temperature resources, electricity generation at small commercial scale in the 100 kilowatt (kW) to 1 MW range is becoming cost-effective. Binary power plants are emission-free in converting the geothermally heated water to electricity through a heat exchanger, turbine, and generator. Small binary power plants have operated in New Mexico on a limited basis and appear to be most effective in meeting on-site electricity needs of businesses with geothermal direct-use applications.

Recent Developments

ECMD has facilitated promotional and technical information exchanges on geothermal energy through a variety of activities. ECMD held the first-ever New Mexico Geothermal Energy Conference in Albuquerque in April 2002, in partnership with U.S. Department of Energy (DOE) and Sandia National Laboratories (SNL), to provide information on New Mexico's geothermal resources and to explore mechanisms by which to encourage further development. In addition, ECMD and SWTDI secured two competitive DOE grants in recent years: $50,000 in 2002 for development of a Geothermal Information Clearinghouse in New Mexico and $38,000 in 2003 to attract businesses to utilize New Mexico's geothermal energy. ECMD continues to coordinate the efforts of the New Mexico Geothermal Energy Working Group, which was established in partnership with SNL under the auspices of DOE's *Geopowering the West* program; the group promotes the development and use of New Mexico's geothermal resources. SWTDI remains a leader in providing technical assistance and information for geothermal development in the state.



Continuous wire-line core drilling at well 45-5 to 3,961 feet depth at Fort Bliss, Otero County, New Mexico. (Source: Jim Witcher, SWTDI)

HYDROPOWER

New Mexico's hydroelectric capacity is 78.4 megawatts from nine plants: Navajo Reservoir (30MW), Elephant Butte (24.3 MW), Abiquiu (15MW), El Vado (8.8 MW), Farmington (200 kW), Alamogordo (60 kW), Raton (30kW), Cloudcroft (15 kW), Reserve (10kW). Although not a substantial portion of the state's total generating capacity, hydropower could play a more significant role in meeting site-specific needs.

Many undeveloped small hydropower sites exist in New Mexico, including river sites and existing dams, but numerous constraints limit the potential. These constraints include financing, multiple-use issues, regulatory barriers, economic issues, and environmental impacts. Details about existing plants and potential sites can be found in earlier issues of the Annual Resources Report.

SECONDARY ENERGY RESOURCES

ELECTRICITY

OVERVIEW

Electricity is important to New Mexico because it affects industrial growth in both the energy and non-energy sectors of the state's economy. Electric utilities also consume substantial amounts of natural gas and coal resources extracted in the state, generating considerable revenues in the process. New Mexico's power plants have a total capacity of more than 6,000 megawatts, over 70% of which is located at two coal-fired plants near Farmington, the Four Corners and San Juan Generating Stations. California and Arizona utilities own approximately 68% of these two plants. Approximately half of the electricity generated in New Mexico is consumed in other states. In July 2003 the first commercial-size wind power plant in New Mexico commenced operation. Known as the New Mexico Wind Energy Center, it is 204 megawatts in capacity, the third largest wind power plant in the world. It is located in eastern New Mexico, about 20 miles northeast of Fort Sumner, in Quay and De Baca counties. The wind power plant is owned and operated by FPL Energy and all the electricity is purchased by PNM.

Over 88% of the state's generation is from coal compared to about 56% nationwide There is much more generation from nuclear and hydropower in the rest of the country. There are four investor-owned utilities in New Mexico, serving approximately 70% of the customers. The 20 rural electric cooperatives serve about 22% of the customers, although they service about 85% of the state's land area. Tri-State Generation and Transmission Association (Tri-State) is a wholesale supplier of 13 member cooperatives. There are seven municipal electric utilities serving the remaining eight percent of the state's electric customers.

Electric utilities that have service areas in New Mexico pay property tax, state and local franchise taxes, and a gross receipts tax which is directly passed on to their customers. The four investor-owned utilities and Tri-State also are assessed a corporate income tax. In addition, all utilities that are regulated by the New Mexico Public Regulation Commission (PRC, formerly Public Utilities Commission) pay an inspection and supervision fee. There are, furthermore, several other indirect taxes and sources of revenue which accrue to the state as a result of the industry's fuel consumption, such as oil and gas royalties, coal severance and conservation taxes, and oil and gas taxes. These are discussed in the appropriate resource section of this report.

ELECTRIC UTILITY INDUSTRY RESTRUCTURING

The Electric Utility Industry Restructuring Act was passed by the legislature and signed by Governor Johnson in early 1999. Under the bill (SB 428), retail competition among electricity suppliers was scheduled to begin on January 1, 2002. However, in 2001 the legislature decided to postpone restructuring for five years (SB266) and in 2002 the legislature repealed the act (SB718).

PRC ORDERS AND RULES

In 2002 the PRC continued hearings and workshops on their proposed rulemaking to require electricity providers to include renewable energy as a resource. They issued a final rule that requires 10% renewable energy by the year 2011 with intermediate requirements. The PRC rule also requires utilities to offer an optional green power tariff so that those customers willing to pay more for renewable power will be able to purchase larger amounts of renewable power.

San Juan Generating Station. (Source: Public Service Company of New Mexico.)

ALCOHOL FUELS

OVERVIEW

Alcohol may be used both as an additive to enhance the pollution characteristics of gasoline fuel, and as a substitute for gasoline. The common alcohol fuels are methanol and ethanol. Methanol is most easily produced from coal, natural gas, wood and organic waste. Ethanol is commonly made from agricultural plants containing sugar. Corn is used as feedstock in the Midwest, but grain milo from New Mexico, Texas, Colorado, Oklahoma and Kansas is normally used as feedstock at the plant in Portales, New Mexico. Ethanol costs less than methanol and is predominant in today's market.

When the intent is to create a cleaner burning gasoline fuel for areas with certain types of air pollution, 5.5%, 7.7% or 10% ethanol (by volume) has been used. The 7.7% "oxygenated" fuel is mandated in Bernalillo County for four months in winter. Ethanol may also be added to gasoline to raise the octane of the blend. Gasoline-based fuel may be up to 1% ethanol by volume in New Mexico without being labeled as an alcohol blend.

When the intent is to displace the use of gasoline fuel, a mix of up to 85% ethanol and 15% gasoline called "E-85" is available in New Mexico. Contemporary automobile fuel injection systems may be inexpensively specified at the factory for use with such fuel. These systems can compensate for variations in fuel mix from 100% gasoline to 85% ethanol, thereby allowing fueling at 100% gasoline pumps or at E-85 pumps.

RESOURCES AND PRODUCTION

The ethanol production industry in New Mexico has seen two distinct phases. During the first phase in the mid-1980s, the production industry was driven by state excise tax credits which allowed for two larger and thirteen smaller production facilities to be built in eastern New Mexico. The largest plant located in Portales had a capacity of 10 million gallons per year, but one state excise tax credits expired in the late 1980s, all of the NM plants were eventually closed.

The second phase began when the Portales plant was sold to a national ethanol company in 1997. Production resumed at this plant in early 1998. Improved operation, enzymes, and yeast efficiency increased production at the original facility to about 15 million gallons per year.

MARKETS

Over 8% of New Mexico's and 13% of the nation's gasoline motor fuel is blended with ethanol. During the four-month winter oxygenation period, about 19% of New Mexico's motor fuel is blended with ethanol, and 60% of the state's ethanol consumption occurs then. Annual ethanol production closely matches annual consumption in New Mexico, but the in-state consumption rate varies at different times of year. Therefore, much of the New Mexico production is sold over a wider geographic region. The recent demise of MTBE (methyl tertiary butyl ether—an oxygenate additive) in California has increased demand for ethanol and, as a result, most of the New Mexico ethanol production is shipped to California.

EMPLOYMENT

Ethanol production created about 80 jobs when both major NM production facilities were operating. The Portales plant currently employs over 40 people. Ethanol production also increases employment in the agricultural and distribution industries.

TAX RATES AND REVENUES TO THE STATE

The state excise tax on ethanol is the same as that on gasoline, 17 cents per gallon. The 15 million gallons of ethanol manufactured in New Mexico therefore generates about $2.55 million annually in state excise taxes.

INCENTIVES

In June 1998, the federal government re-introduced federal ethanol fuel excise tax incentives effective through the year 2007. In simplified terms, the fuel blender may take either an income tax credit of 54 cents per gallon of ethanol used, or an exemption from the excise tax of 5.4 cents per gallon of 10% blended fuel.

RECENT DEVELOPMENTS

A Spanish company, Abengoa, purchased the Portales plant in 2002, and an expansion in plant capacity is planned. Drought and market conditions have caused a drop in regional milo production. The Portales plant may therefore need to use corn as feedstock on a seasonal basis. This change would have minimal impact on plant operation.

The impact of E-85 on the ethanol fuel market could be large. E-85 vehicles can be purchased for a small incremental added cost. Such vehicles are becoming common in government fleets, and the fueling station infrastructure has begun to develop, with one public access and one government-access station available in Albuquerque, and one station in Santa Fe. The impact of E-85 will ultimately be dictated by the relative cost of ethanol and the availability of fueling stations.

FOREST RESOURCES

I think that I shall never see
A poem lovely as a tree
~Joyce Kilmer (1886–1918)

OVERVIEW

Joyce Kilmer's quote may be taken as a matter of opinion, not a fact. Often the two are intricately woven. The sun rises in the east is a fact, until you describe the sunrise. Mist rising from the foot of Jemez Falls, hopefully will always be fact. There is beauty in elk grazing in a meadow circled by new grass, fireweed and standing charred ponderosa pine trees, opinion or fact? This year, as in many previous years and years to come, that is both opinion and fact. Is it beautiful?

Many would contend that any particular forest stand was beautiful before the fire, but after a fire, want never to view it again. The numbers of visitors to Yellowstone National Park were predicted to decline drastically following the 1988 wildfires that burned nearly 36% of the park. Visitation didn't decline. While the term beautiful is an opinion, the fact is that the landscape is now different. It is changing just as the landscape has changed for centuries. Fire accentuates the changes that nature can handle. It's man that has trouble handling the changes. The changes following a fire bring diversity back to generally dense, unhealthy and unproductive forest stands.

The Forestry Division (FD) is working with public and private landowners through varied programs and avenues on forest health restoration. Unhealthy forests are not found just on public lands, or even in rural areas. Forests in our urban areas have social stresses on top of the changing environmental stresses.

FOREST RESOURCE MANAGEMENT

One slogan used by The Society of American Foresters (SAF) reads: "A Healthy forest is no accident." Another is: "Foresters, Our job is growing." The SAF is a resource for our staff in continuing education and sharing information with other foresters to reduce duplication, or waste time doing something that doesn't work as well as another method.

Healthy forests are achieved through resource management. A wide cross-section of management objectives are sought by New Mexicans, ranging from aesthetics to production of sawtimber and specialty wood products, as well as improving wildlife habitat for a variety of animals, including big game for hunting opportunities. These management objectives do not necessarily work against each other, but can work in concert toward making healthier forests and woodlands.

The FD provides landowners with professional guidance and technical assistance to meet their land management objectives and assure proper consideration of the land, its resources, and its future. The FD also works with public land management agencies and municipalities in providing management planning for the future.

The FD promotes the use of best management practices (BMPs) in resource management plans and timber sales contracts through the application of technical forest resources management assistance

to state and private landowners. The application of BMPs is monitored during the harvesting of forest products on private lands with a final assessment performed at the completion of sale. A total of 41 harvesting permits were issued for 18,966 acres, bringing the total acreage during the year under harvest permits to 119,528 on 123 properties. The FD wrote or influenced 221 forest management plans covering 8,101 acres. A majority of these plans (217) were written for homeowner defensible space and or fuels reduction projects around communities. The plans are written in conjunction with grant monies that will fund the treatments, reducing the threat of losing homes to wildfire.

THE EFFECTS OF DROUGHT

It is easy to see what the drought is doing to the yard around your house. It is even easy to see the effects when you look at the reservoirs and lakes. It's becoming easier to see the effects in the woodlands and forests as one drives the highways and byways of the state.

Conifer trees, like pines and firs, use a resin, or sap, as a defense mechanism against invading insects. Without enough water to not only feed itself, but also defend itself, the tree can become a casualty of drought. A tiny insect, an *Ips* beetle or bark beetle, is taking advantage of trees having a low supply of resin. Trees with other stresses or damage are prime candidates for bark beetle colonization.

The general way colonization occurs is by the beetle chewing through the bark and excavating a chamber in the moist tissue beneath the bark. They then produce an "aggregation" pheromone, drawing many beetles to the tree. The adult beetles mate and the female then excavates distinctive tunnels or egg galleries under the bark.

Adult beetles may introduce a number of microorganisms to the tree when they attack. Introduced bluestain fungi are particularly damaging to the tree and may provide nutrition for the developing brood. When populations of bark beetles are very high, particularly around an outbreak, so many beetles may attack trees that even healthy trees succumb.

If the drought continues, the *Ips* beetle population could reach epidemic proportions and the piñon mortality will cover hundreds of thousands more acres.

Foliage high in the tree begins to fade, turning from green to yellow or red after the tree has been attacked. Once this has occurred, there is little if anything that can be done to save that tree.

The Ips bark beetle affected 500,000 acres of pinon woodland in 2002.

THE AMERICAN TREE FARM SYSTEM

One avenue for working with landowners is the American Tree Farm System. There are 160 Tree Farms in NM. Periodic meetings bring the landowners together to share ideas and information for better resource management that is not limited to trees. Many of the Tree Farms in NM are ranches that have been held for generations and are managed for multiple-use.

A joint New Mexico and Colorado Tree Farmers meeting was held in August to recognize both state's Tree Farmer of the Year. The winners had ranches bordering each other and that crossed both the Continental Divide and the state line. The New Mexico winner was the Chromo Mountain Ranch owned by Dr. Richard and Sue Gooding. The Colorado winner was the Diamond S Ranch owned by Jeb and Cecilia Binkly. These families were recognized for their commitment to land stewardship and for their active forest management programs.

A record number of 70 attendees included tree farm landowners from both states, state forestry personnel, consultants and others interested in the management of private forest lands. Participants saw many practices

Prior to defensible space treatment — After treatment.

Navajo Peak can be seen from Chromo Mountain and Diamond S Ranches, hosts of the Fall Tree Farm Meeting.

which promote the mission of the American Tree Farm Program: "To promote the growing of renewable forest resources on private lands while protecting environmental benefits and increasing public understanding of all benefits of productive forestry."

PHILMONT SCOUT RANCH DEMONSTRATION FOREST

A demonstration forest is a small-scale version of a working forest that demonstrates techniques of forest management. Forest management is usually practiced over an area of hundreds, or even thousands of acres, which makes understanding of its various aspects difficult for the occasional visitor. Located on the Cimarron District, the Philmont Scout Ranch Demonstration Forest is a piece of land, 45 acres in size, with ponderosa pine, Douglas fir and white fir forests. Jeff Creek runs through the forest and along its banks grow cottonwoods, willows, alder and aspen. The Philmont Demonstration Forest includes a self-guided outdoor classroom tour with learning stations for educating scouts in the summer time and the public during the rest of the year.

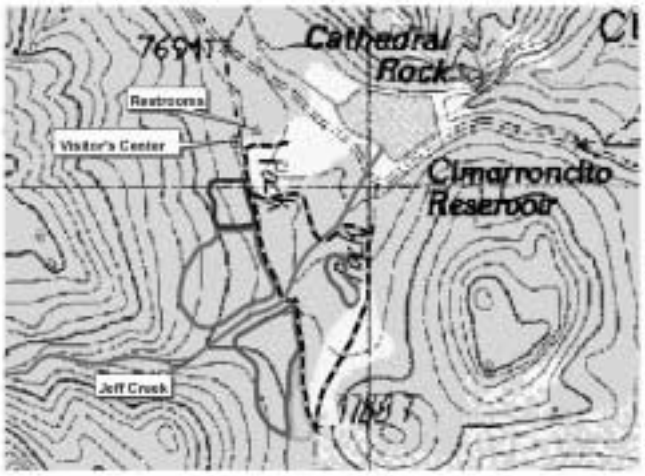
Good forest management is always a work in progress. The Philmont Scout Ranch Demonstration Forest will need additional harvests and thinnings as time goes on. A forest is in a perpetual state of growth and change. Recognizing the natural processes that grow and change a forest and working with these processes is the key to good forest management. This involves a long-term commitment and a recognition that the job is never done.

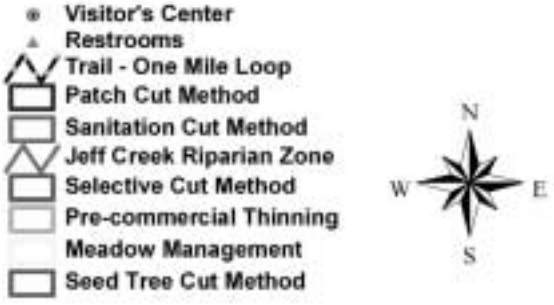
Demonstration forests, a program of the American Tree Farm System, are designed to demonstrate good forest harvest techniques and to teach about forest ecology. The Philmont Scout Ranch has agreed to sponsor a demonstration forest as part of their commitment to good forest management. It is New Mexico's first demonstration forest and was dedicated on October 26. Sixty-two people were in attendance including tree farmers, local ranches, local schools, government agencies and media. Look for other demonstration forests coming to the woods near you in the other FD districts: Chama, Socorro, Las Vegas, Capitan and Bernalillo.

FOREST LEGACY

Congress created the Forest Legacy Program in 1990 as part of the Farm Bill. Funds are made available to the State of New Mexico by a grant from the USDA – Forest Service. Its purpose is to help landowners, state and local

Figure 1. Philmont Demonstration Forest





A whirlwind over the Ponil fire takes ash and debris high into the air.

governments, and land trusts to identify and protect environmentally important forestlands that are threatened by present or future conversion to non-forest uses.

The first step in making Forest Legacy available to New Mexico landowners was a statewide study of the current status of private forests and the threats to convert them to non-forest uses. The Assessment of Need was conducted in 2001 and was approved by USDA Secretary Ann Veneman in March, making New Mexico the 28th state to join the Forest Legacy Program

Private landowners who want to conserve the special values of their land for future generations may apply to sell the development rights to all or part of their properties to the State of New Mexico. These 'conservation easements' are held in perpetuity by the state and effectively retire the rights to subdivide and develop the properties for non-forest uses.

Participating landowners retain all other rights to their properties including occupancy, use for enjoyment or profit, and transfer to heirs or sale to new owners. In other words, the landowner continues to live and work on the land. Property taxes are paid on the retained rights, as determined by the county assessor. These private forests continue to produce wood products, provide wildlife habitats and open space, contribute to watershed integrity, and are protected from urban sprawl. Twelve landowners have applied this year.

FIRE RESOURCE MANAGEMENT

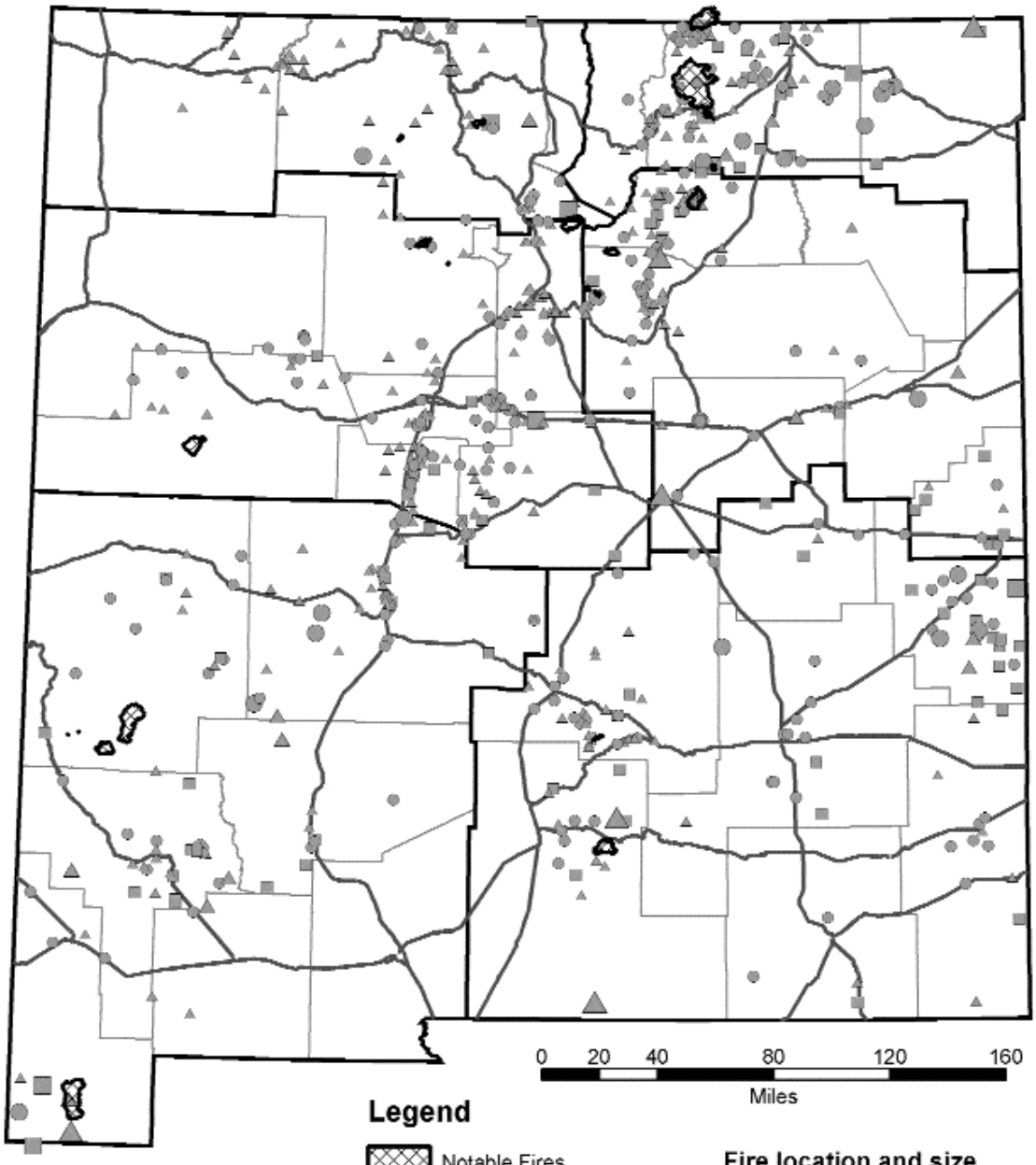
For the first time Incident Management Teams were called to fires in every district at least once.

A lightning burst on June 1-2 started 70 fires; three merged to create the largest fire in the state's history burning 92,194 acres before it was declared controlled on July 14. The Ponil fire covered portions of Philmont Scout Ranch, Vermejo Park Ranch, and other private ranches, Elliot Barker State Wildlife Area, and the Carson National Forest – Valle Vidal Unit.

The FD helps protect not only 43.9 million acres of land from fire as one

Table 1. Notable Fires In 2002

Date	Name	Acres	District	County
3/23	Kokopelli	985	Capitan	Lincoln
3/31	Middle	37,600	Socorro	Catron
4/30	Penasco	15,904	Capitan	Otero
5/6	Dalton	804	Las Vegas	San Miguel
5/22	Borrego	14,533	Bernalillo/Chama	Santa Fe/Rio Arriba
6/1	Spring	6,275	Cimarron	Colfax
6/2	Ponil	92,194	Cimarron	Colfax
6/2	Bonita	1,150	Cimarron	Colfax
6/2	Cerro Pelado	13,179	Las Vegas	Mora
6/7	Cherry	15,000	Bernalillo	Cibola
6/11	Montoya	4,257	Chama	Rio Arriba
6/13	Roybal	895	Las Vegas	San Miguel
6/15	Trampas	2,800	Las Vegas	San Miguel
6/27	Walnut	27,713	Socorro	Hidalgo
8/25	Lakes	4,096	Bernalillo	Sandoval



Datum: NAD83 Projection: UTM, Zone 13N
Fires involving any portion of state and/or private land are classified as statistical fires. Fire data from Division records. Base layer data from RGIS Clearinghouse. No warranties are made regarding the accuracy of this data.
Produced by NM EMNRD Forestry GIS.

of the primary wildland fire fighting agencies, but also human lives and property. Working with the other agencies and municipal and rural fire departments the FD responds to an average of 1,079 fires that burn 188,729 acres (1993 – 2002 averages). Over this same time period, 71% of the fires were human caused. Individual years show the variability in human caused fires. Eighty-six percent of the 786 FD statistical fires in 1998 were human caused, and that dropped to 61% of the 842 FD statistical fires in 2002. A FD statistical fire is one that involves any state or private land.

Our working partnerships with other resource agencies allows the closest resource to initial attack the fire, no matter what the jurisdiction of the property. If the fire continues for a specified amount of time, the agency responsible for that land takes over the management of the fire suppression. This arrangement has minimized damage and threat to human life in most cases by catching the fire when small and manageable. In a fire season that showed extreme fire behavior there were only 20 fires that exceeded 1000 acres.

Table 2. 2002 Statistical Fires by Size Class (Source: FD)

Size Class	Total Number of Fires	Total Acres Burned	Total Est Expenditures
.25 Acre or less	362	48.79	$ 1,393,590.00
.26 to 9.99 Acres	327	779.56	$ 740,655.00
10 to 99.99 Acres	91	2,985.89	$ 963,344.00
100 to 299.99 Acres	19	3,023.00	$ 284,750.00
300 to 999.99 Acres	23	11,733.50	$ 1,149,310.00
1000 to 4999.99 Acres	9	15,897.55	$ 1,467,006.00
5000 Acres or more	11	200,409.00	$ 16,243,616.00
TOTALS	842	234,877	22,162,273

CONSERVATION EDUCATION

The FD is active in providing environmental education programs for youth and adults in New Mexico. Conservation Day programs and Arbor Day programs are the primary programs provided by the division. Personnel also assist other agencies and organizations with additional educational programs geared toward the environment.

Two Conservation Day programs were hosted this year. The programs provided a full day of outdoor classroom activities for elementary age children. The FD also sponsored an Arbor Day project at Smokey Bear Historical Park. The project consisted of planting trees and shrubs, raking, pulling weeds and cleaning up the Veteran's memorial in Capitan.

The FD assists the Future Farmers of America Organization by providing materials and technical assistance for their Forestry Career Development Events state-wide and nationally. Personnel participated in five of these events in 2002 and participated in their annual summer workshop in Ruidoso by providing forestry materials and technical assistance to the agriculture teachers.

Smokey Bear Historical Park hosted a summer youth program for elementary age children in the area. Each of the six week sessions had a different environmental theme. The students learned about their environment through indoor and outdoor activities, videos and presentations.

A new avenue for education to the FD is the American Tree Farm System demonstration forest. Read about the Philmont Scout Ranch Demonstration Forest under the Forest Resource Management heading. The Philmont demonstration forest is larger and in a more visible location than a demonstration area on the Quintana Tree Farm in Cebolla on the Chama district that was active in the early 1980s.

Cimarroncito Reservoir on the Philmont Scout Ranch Demonstration Forest.

TREE SEEDLING DISTRIBUTION PROGRAM

Trees are a renewable resource and a living member of every community. The demand for new trees is never-ending. New Mexicans plant trees for wildlife habitat, to create shelterbelts and windbreaks, to control erosion, for use as Christmas trees, and to reforest areas, promote conservation and help individuals create a more

beautiful, healthy, and ecologically balanced environment.

In concert with New Mexico State University's College of Agriculture and Home Economics, and the Department of Agronomy and Horticulture's Mora Research Station, the FD is a premier provider of tree seedlings in the state. FD has a big influence on the kinds and quality of trees planted to shade, shelter and comfort future New Mexicans. Seedlings are grown with the customer planting them in mind. New species are added and others removed, based in part on information provided to us by citizen buyers. Seedlings are bundled for many purposes including riparian restoration.

The number of trees produced and sold by the FD varies each year, averaging 162,000 sold to New Mexico landowners at cost. The sale and distribution of large sapling size trees for schools, municipalities and local governments further enhance the program. We offer more than 45 species of seedlings that can be planted in New Mexico's wide range of elevation and climate.

HIGHLIGHTS FOR SEEDLINGS

The US Forest Service and City of Los Alamos brought together many volunteers to plant 30,000 FD seedlings in an area burned in 2000 by the Cerro Grande Fire.

This fall, on-line seedling orders were accepted for the first time allowing customers to place their order from the comfort of their home. This real-time ordering is one way to beat the rush for those species with limited availability.

URBAN AND COMMUNITY FORESTRY

Who doesn't like to sit and watch birds singing from the branch of a tree or smell the fragrance of blooming fruit trees in the spring. Even as we enjoy these pleasures from trees, they are providing so much more. Three well-placed mature trees around a house can cut air-conditioning costs by 10-50 percent, while trees and other landscaping can increase property value by 5-10 percent. And parking in the shade of a tree when you have to be in a store for more than five minutes is a benefit often fought over in our hot summer months.

The history of urban and community forestry in the United States can be traced back to a Philadelphia ordinance in 1700 that required homeowners to plant trees outside their doors. That was fifty years before Philadelphia began systematically planting street trees. J. Sterling Morton didn't start Arbor Day until 1872 in Nebraska. As people moved west the idea moved with them, albeit slowly. It wasn't until 1972 that Congress charged the United Stated Forest Service and state foresters to assist local governments with urban forest issues.

Trees make cities livable, adding beauty and keeping them cool. The absence of trees directly threatens human health by increasing smog and, according to the National Oceanic and Atmospheric Administration, has contributed to an ever-growing number of deadly heat waves in the past 50 years.

Many New Mexico communities do not have defined municipal tree care programs. Those that do are often under funded. Most trees in city parks and other public places are aging and in decline. Those trees (often called a community's "forgotten infrastructure") become, unsightly, more expensive to maintain or remove and can be a public hazard.

Our Community Forestry program offers technical assistance to New

An afternoon stroll in an Albuquerque park.

Mexico communities to address and improve tree problems. Citizen participation is a critical part of "getting the job done". Civic/volunteer groups, and citizen partnership (tree boards) with their local governments can bring a community together toward long term sustainability of their urban environment.

The FD has partnered with Tree New Mexico Inc. (TNM) for 11 years to organize a statewide network of volunteers and assist our citizens with urban and community forestry. Their mission statement reads: "*Tree New Mexico is dedicated to ensuring sustainable forests in urban and rural communities and natural areas through restoration, public education and advocacy*." TNM has a wide variety of programs to carry forward their mission and influence the New Mexico landscape. TNM's long term, successful and highly prized relationship with the FD showcases how public-private partnerships accomplish more than either entity could have done alone.

FOREST-BASED COMMUNITY ASSISTANCE

The avenue available to the FD for Forest-Based Community Assistance

Figure 3. Five grants were awarded to New Mexico businesses in 2002:

- Espanola - the project's objective is to provide a high quality, affordable small diameter timber log home kit that is fast and easy to construct. Andale plans to manufacture 8' X 8' panels from 4" to 7" diameter material from forest and watershed restorations projects.
- Montezuma – the project will demonstrate that newer technologies can be effectively applied to older sawmill operations and equipment at affordable prices, while increasing efficiency, productivity, and decreasing major capital outlay for equipment. The project will create two new full time jobs and utilize material that comes from the Gallinas watershed restoration project.
- Red River – the project will demonstrate and implement a truck transport system for chipped slash as the slash management system of choice in support of ongoing forest thinning projects that are part of the Red River Wildland Urban Interface Hazard Fuel Reduction Master Plan by purchasing two storage containers.
- Ruidoso – one project addresses the cost of handling small diameter wood. With the purchase of a sling loader the reduction of handling the material to a minimum increases efficiencies. This from the same business that developed a successful wood utilization model by introducing technology and practices to produce cost effective animal bedding and restoration by-products from small diameter wood generated by forest and watershed restoration treatments.
- Ruidoso – a second project will develop an efficient process to retrieve, load and haul small diameter materials to small business in the Ruidoso area in an economically and timely manner. The purchase of a trailer with a grappler and an ATV will assist service that is currently not available in the Ruidoso area. Partners include the US Forest Service, Village of Ruidoso, the thinning contractor and the grantee of Ruidoso project mentioned above.

is the Four Corners Sustainable Forests Partnership (FCSFP), which was started in 1997 with the leadership of then New Mexico State Forester, Toby Martinez, and other Western State Foresters. The group saw increasing risks for catastrophic fire and insect outbreaks in forest ecosystems as well as a declining capacity in communities to deal with forest restoration and maintenance needs throughout the Four Corners region. These conditions exist across social and jurisdictional boundaries in the Four Corners States of New Mexico, Colorado, Utah, and Arizona.

The FCSFP builds linkages between healthy forest ecosystems and healthy communities. Funding is only available through 2003 to support continuing projects and programs. FCSFP is hopeful that programs will create a lasting momentum within several key areas: consensus around forest restoration principles and needs, community infrastructure to utilize small diameter material, and a region-wide network of interests and specialists working on sustainable forestry issues. Specific information on awarded grants in New Mexico is provided.

INMATE WORK CAMP

The Inmate Work Camp (IWC) program provides the FD with the means to assist other agencies and municipalities in meeting forest health and other management objectives. This year inmates providing support and labor for projects were not only from the first FD camp at the Central New Mexico Correctional Facility, Minimum Security Unit in Los Lunas, but also the female inmates from the Western New Mexico Correctional Facility in Grants.

Crews are trained in the proper use of all project equipment from hand tools to chainsaws, and a few have become small engine mechanics, keeping the equipment in safe working condition. Land management agencies including the US Forest Service, Middle Rio Grande Conservancy District, NM State Parks and Albuquerque Open Space hire the crews to complete restoration work from the Bosque to the mountains. Constructing fuel breaks and chipping the material understory thinnings, acequia cleaning, fire suppression, burned area rehabilitation and tree planting are just some of the types of projects crews are assigned.

The Los Lunas camp maintains a green house for FD seedlings. Unsold seedlings are re-potted and grown out to sell as large containerized seedlings the following seedling program year. IWC also assists the seedling program in packaging the seedlings for delivery and shipment from the Santa Fe greenhouse.

FOREST RE-LEAF

Tree planting projects for schools, communities, and other agencies are made possible by you. The FD Forest Re-Leaf Program is funded by the generosity of citizens of New Mexico.

The New Mexico Forest Re-Leaf Act became law in 1990. The legislature recognized the health and safety of our increasingly fragile environment it threatened daily by increased emissions of carbon dioxide. The health and safety of citizens is directly related to that of their environment. Trees clean the air; protect and promote soil, energy, and water conservation; and generally enhance the state's environment and quality of life. The Act promotes protection of the environment and the improvement of the quality of life by encouraging and arranging for the planting of trees throughout the state by any and all residents of New Mexico.

The residents of New Mexico have taken tree planting to heart. Through the generosity of citizens donating via their income tax return and during the Seedling Program ordering process, as well as foundations and corporations, the grant awards were increased this year to $3,000 per project proposal. Submit a grant application today and join the thousands that have planted trees in their community for the enjoyment of generations to come.

RECREATIONAL RESOURCES

NEW MEXICO STATE PARKS

Formed as the New Mexico State Parks Commission in 1933 through the work of the Civilian Conservation Corps, the New Mexico State Parks Division (SPD) has grown into a 31-park system that encompasses 182,450 acres of land and 20 lakes with a combined 103,448 surface acres. About 270 full-time employees strive toward the Division's goal of protecting the state's precious natural resources while providing recreational and educational opportunities to the public. Almost 4 million people visited at least one state park in fiscal year 2003, injecting an estimated $100 million into the state's economy.

Drought and a struggling economy presented numerous challenges to the Division in fiscal year 2003. As lake levels dropped, so did park visitation, resulting in less revenue generated for the Division, which relies on visitation fees, grants, federal and other tax sources for about 60 percent of its annual $22 million operating budget. Fewer visitors contributed to a $1.1 million revenue deficit in 2003, a shortfall mostly made up through operational cutbacks and forced job-vacancy savings.

The state Legislature supported safe boating in New Mexico by passing a bill establishing a blood-alcohol level for boat operators.

The SPD had many successes in its first year under Governor Bill Richardson's administration and new SPD Director Dave Simon. The year was highlighted by positive advances in the state Legislature, expansion of the Division's educational programs, resource protection efforts, and the first steps toward opening two more state parks.

LEGISLATURE SUPPORTS BOATING SAFETY, NEW PARKS

Boating Under the Influence

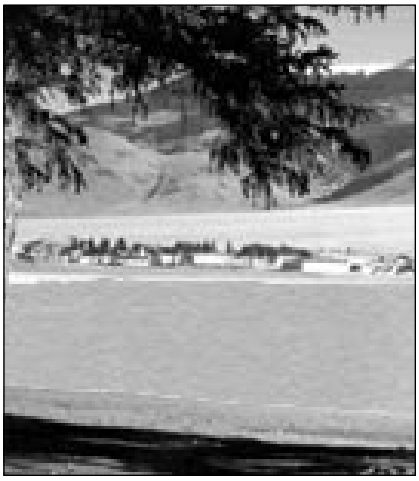
The Legislature passed SB 434, which established a blood-alcohol level for boating under the influence and will make our lakes safer by providing a deterrent to dangerous behavior. Heretofore, New Mexico was the only state that lacked such a standard.

The legislation compliments ongoing efforts by SPD to ensure the safety of boating in New Mexico. In 2003, state marine enforcement officers conducted 8,346 boat safety inspections and instructed more than 25 free 8-hour boating safety classes.

Fees & Revenue

The Legislature passed House Memorial 18 and Senate Memorial 44, requesting the SPD to study its current fee structure and revenues.

Mesilla Valley Bosque State Park.



Eagle Nest Lake State Park.

The study and recommendations were presented to the Legislature.

Mesilla Valley Bosque State Park

The Legislature provided about $84,000 for a master plan, land acquisition and development at this proposed park in Dona Ana County.

Eagle Nest Lake State Park

The Legislature approved three full-time employees, but no operating budget for SPD to begin managing

Eagle Nest Lake as the state's 32nd state park. The state purchased the 4,885-acre park, including the 2,400-acre lake, for $20 million in 2002. Eagle Nest currently is managed by the New Mexico Department of Game and Fish. State Parks has requested funding to open the park as soon as possible, and is working with the Department of Game and Fish on a cooperative agreement for long-term management.

EDUCATIONAL PROGRAMS ATTRACT RECORD CROWDS

Park visitors found much more than fishing, camping and water sport activities in 2003, as the Division renewed its commitment to family-oriented education. From guided hikes and stargazing to campfire talks and weekend special events, rangers conducted 1,800 interpretive programs for nearly 186,000 people. Some highlights:

Star Parties

A series of statewide astronomy events were among the year's biggest attractions. Visitors from nearby communities and as far away as Tucson, Denver and Amarillo came to the parks to hear presentations about the constellations and the cosmos, and to take a peek through SPD telescopes. As word spread about the events, star parties began attracting hundreds of visitors. Excitement peaked in September when the planet Mars made its closest pass to Earth in nearly 60,000 years.

Discovery Weekends

Thousands of park visitors, especially families, made special plans to attend one of the four Discovery Weekend programs conducted at parks in 2003. The weekend events included three days of educational and fun programs, tours, hikes and games presented by park rangers and professional interpreters. The programs were conducted at Santa Rosa Lake, Hyde Memorial State Park, Caballo Lake and Percha Dam state parks, and Conchas Lake State Park.

Discovery Weekends promote family education and fun each year at four separate parks.

Flintknapping demonstrations are popular with families attending Discovery Weekend programs.

CELEBRATIONS, RESTORATIONS HONOR STATE PARKS' BEGINNING

In the spring and summer of 2003, New Mexico State Parks celebrated its 70th birthday by honoring the Civilian Conservation Corps (CCC) and New Deal programs that laid the foundations for state parks.

In honor of the hard work of the CCC and the Works Progress Administration, the SPD conducted a series of special programs at eight of the system's 31 parks. The programs included historic tours, exhibits, living history demonstrations and slide shows about the rock walls, lodges, dams and other structures that stand as solid tributes to the 50,000 young men of the CCC who made them from 1933-41.

The distinct, massive CCC rock construction can be seen statewide. It's in the retaining walls and bridges along the Santa Fe River, the lodge and campground shelters at Hyde Memorial State Park and the dams at El Vado and Conchas lakes. It's in the bathhouse at Bottomless Lakes State Park, the buildings at Bandelier National Monument and Bosque del Apache National Wildlife Refuge, and the familiar Kiwanis Cabin atop Sandia Crest.

Bottomless Lakes, one of the first state parks, celebrated its beginning

Hundreds of visitors attended the grand reopening of the renovated Civilian Conservation Corps bathhouse and water tower at Bottomless Lakes State Park.

The historic lodge at Hyde Memorial State Park is one of many State Parks structures built by the Civilian Conservation Corps in the 1930s.

on May 17 with a grand opening ceremony of the renovated visitor center, water tower and Lea Lake bathhouse. Overall, $1.2 million was spent on park renovation and improvements, including a new restroom, outdoor showers, a new wastewater plant, new parking lot and a canal to accommodate overflowing lakes and prevent highway flooding. The park visitor center was also renovated and now houses exhibits featuring the park's history and geology.

PARKS ON CUTTING EDGE OF FOREST-THINNING, SALT CEDAR ERADICATION

New Mexico State Parks established itself as a leader in efforts to conserve water and protect the state's natural resources from wildfire and invasive plant species.

Forest Thinning

New Mexico's first state park got a much-needed facelift in 2003 that will make its forested area healthier and more attractive to visitors while protecting the area and surrounding forestlands from catastrophic wildfire. Hyde Memorial State Park was one of the first public parks in the state to commence with forest-thinning projects.

More than 100 cords of wood and 150 cubic yards of chipped mulch were removed from a 42-acre section of the park during a summer forest-thinning project. The project, funded by a $50,000 federal grant arranged by the New Mexico Forestry Division, is expected to be completed in the spring of 2004. By then, the amount of removed wood and mulch will have more than doubled.

Before forest thinning at Hyde Memorial State Park.

After forest thinning at Hyde Memorial State Park.

A 35-acre thicket of invasive salt cedars was removed from Leasburg Dam State Park.

Salt Cedar Eradication

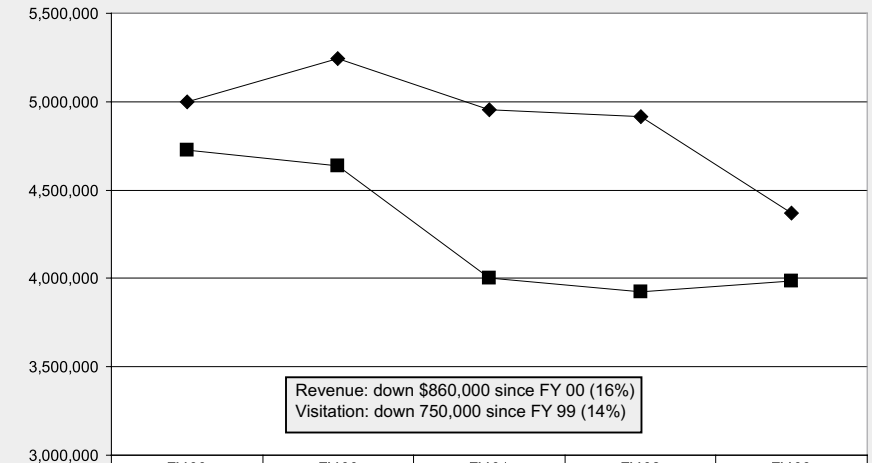
Leasburg Dam State Park was on the front lines of a statewide battle against salt cedars in 2003. Crews dealt the final blows to a 35-acre thicket that choked off native vegetation. With the invasive plants gone, experts expect some of the native cottonwoods, screw-bean mesquites and native grasses will start coming back, and habitat will be more favorable to wildlife, including the endangered Southwest Willow Flycatcher.

The work at Leasburg Dam State Park was part of a $2.5 million program funded by the 2002 New Mexico Legislature to help eradicate the invasive salt cedars along the Rio Grande. The money was distributed among regional soil and water conservation districts, which work with landowners, issue contracts and oversee the projects. About $40,000 went into the Leasburg project, one of the first in southern New Mexico. In Albuquerque, a $200,000 habitat restoration effort is under way at Rio Grande Nature Center State Park near the site of a dangerous wildfire fueled by salt cedars in the summer of 2003.

DROUGHT BRINGS NEW CHALLENGES, RENEWED COMMITMENTS

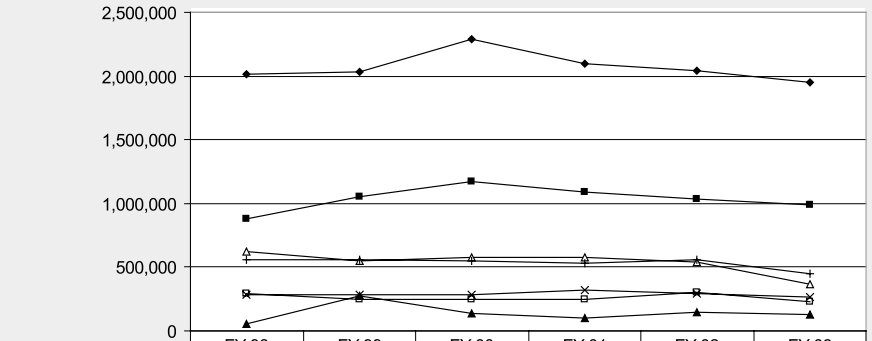
The ongoing drought posed serious challenges to the state's 31-park system, which includes 20 lakes and numerous streams and rivers. A skimpy runoff from the winter of 2002, combined with the demand

Figure 1. Visitation & Self-Generated Revenues Comparison FY 99 - FY 03



	FY 99	FY 00	FY 01	FY 02	FY 03
Revenue	4997100	5245700	4955800	4917800	4371740
Visitation	4725298	4638507	4002939	3922888	3983454

Figure 2. Self-Generated Revenues FY 98 - 03



	FY 98	FY 99	FY 00	FY 01	FY 02	FY 03
Admissions	877400	1050200	1168000	1093000	1034300	989461
Camping	2014100	2029400	2288300	2095800	2042900	1949079
Boat Excise	625600	549300	578200	574200	536600	363349
Boat Registration	556200	562300	548700	531200	557700	451545
Bldg/Land Leases	297400	245200	244600	244900	305500	229486
Concession	284000	283900	279900	319600	294900	264782
Other	58600	276800	138000	97100	145900	124038

for irrigation water severely diminished the water-recreation resources of several lakes, most of which supply neighboring communities with tourism-based income. Although all parks were able to accommodate boating through the Memorial Day and July 4 holiday weekends, the remainder of the summer was difficult as water levels plunged to lows not seen since the early 1970s.

Through the summer, state parks employees worked diligently to upgrade boat ramps and maintain facilities to keep the lakes open for water sports and other recreation. Committed to the more than 50 New Mexico communities directly affected by state parks, the Division worked closely with area groups and governments, organizing special events to attract more visitors and worked hard through the media to dispel some rumors that the parks were not open. Those efforts brought a near-normal crowd of 72,000 to Elephant Butte Lake State Park for Memorial Day weekend, and more than 100,000 people for the July 4 weekend.

The State Parks Division worked with the community of Elephant Butte to stage a successful Elephant Butte Balloon Regatta, one of several events that attracted more vistors to the area.

Visitation dropped off, however, after the July 4 holiday. Elephant Butte Lake State Park, the state's largest and most visited, felt it the most. By summer's end, only one of four boat ramps was fully operational. The park suffered a 12 percent decline in fee collections at the park in fiscal year 2003.

The state's other lake parks faced similar losses. They included Navajo Lake State Park, the state's second-largest, along with El Vado, Heron, Santa Rosa, Sumner, Storrie and Brantley lakes. Only Ute Lake in the northeast had a steady, good water year, as its storage is not dependent on irrigation demands.

The lower water levels gave parks crews opportunities to extend access roads and boat ramps as the water receded, making the ramps less vulnerable to future droughts while maintaining access for current boaters. Despite the rapidly falling water, only two parks – Santa Rosa Lake and Storrie Lake – were forced to curtail boating. The others, including Elephant Butte and Navajo, offered recreational boating even when the water reached its lowest point.

NEW MEXICO YOUTH CONSERVATION CORPS

The Youth Conservation Corps (YCC) Act was established by the 1992 Legislature. The purpose of the Act is to provide a process to employ young persons in public projects that conserve New Mexico's natural resources and provide community benefits of lasting value. Sponsors for YCC projects may be any local unit of government, state agency, federal agency, nonprofit organization that is recognized by the Internal Revenue Service as a 501(c)3, or federally recognized Native American tribe. In the first three years of the YCC, the legislature appropriated funds for the operation of the program. In 1994, legislation was introduced and passed into law (Laws of 1994, Chapter 145) so that the YCC would receive 10% of the revenue from the Governmental Gross Receipts Tax collections. This is recurring revenue and receipts are distributed monthly; therefore they accumulate prior to expenditure.

The Commission solicits sponsor organizations and projects under a competitive grant process. There are two types of projects - summer and seasonal. A summer project operates during the months of June, July and August. A seasonal project operates any time of the year and is six months or less in duration.

The criteria for funding projects are as follows:

Work Plan – Quality of work plan and schedule, including feasibility of project, potential for effectively carrying out the project and priority for hiring youth. Project's compliance with conservation and community service objectives set forth in Section 4, Section 9-B-4 NMSA 1978, of the New Mexico Youth Conservation Corps Act.

Education – Level of educational curriculum that will (1) enhance academic skills, (2) provide new learning experiences relevant to the work place, (3) provide opportunities for the development of skill, discipline and good work habits, and, (4) develop positive attitudes to remain in and/or return to school.

Project Budget – Financial commitment to hire YCC members as demonstrated by dollars to be spent on Corps member wages. Quality and reasonableness of cost estimates, including sponsor's ability to contribute the necessary financial and human resources to the project.

Program Services and Benefit to the Community – Services to the New Mexico Community to conserve resources and provide a visible benefit of lasting value to the community.

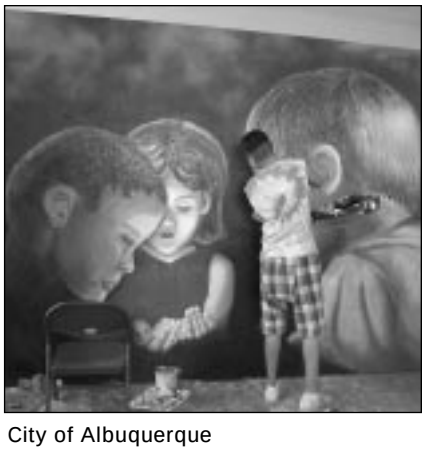
Qualifications and experience of individuals directly responsible for managing the project.

Coordinative Arrangements – Level of coordinating arrangements developed with local community organizations, businesses, labor, educational organizations and other service organizations, including verification of such.

In 2002, the YCC Commission awarded $2,987,858 in grants. Forty-four projects were funded: 22 to local government entities, 7 to state agencies, 13 to non-profit organizations that are recognized by the federal government as a 501(c)3, and 2 to tribes. YCC was able to employ 812 youth through these 44 projects.

Town of Estancia

Capitan Forestry Division, EMNRD



City of Albuquerque

The Commission also supported the New Mexico National Guard's Youth ChalleNGe program in the amount of $521,679.50. This 22 week residential program allows youth who have dropped out of school and are between the ages of 16 to 18, to pursue their GED and other types of training. This year, 186 Corps members graduated from the program. Besides furthering their educational opportunities, Corps members develop job skills and employment ethics by working in projects that will improve New Mexico's natural and community resources. After graduation, Corps members returning home will have a "mentor" in their community who they can turn to for advice and assistance in obtaining the goals they set for themselves during the residential program.

The Commission has implemented an effective monitoring and tracking system to evaluate the effectiveness of the program. This includes a tracking system for Corps member's status after completion of the YCC project (employed, returned to school, enrolled in post-secondary program, GED program). Corps members' also benefit from the educational component of the program.

TUITION VOUCHERS/ CASH BONUSES

The Commission and Legislature believes strongly in education for New Mexico's youth. In support of this belief, the Act allows for Corps members to receive as additional compensation, a five hundred dollar ($500) cash bonus or a one thousand dollar ($1,000) educational tuition voucher. To be eligible, they must have 12 months of service in a 48-month period. The tuition voucher may be used at a New Mexico institution of higher education. In 2002, $14,385.32 in scholarships were awarded. Twenty-three young people took advantage of this opportunity.

YCC benefits New Mexico in many ways. Projects that otherwise would not take place are completed. These projects range from improving National Forest trails to designing and installing tile mosaics to growing vegetables. The projects have one thing in common; they are designed to serve the public by improving the quality of life of New Mexico citizens. Getting these projects completed is important but the greatest benefit to New Mexico is the experiences the Corps members receive. The whole purpose of the program is to employ young people, our future leaders, in meaningful jobs. These jobs develop skills, teach responsibilities, and instill a sense of pride in the Corps members. Corps members are also encouraged to further their education, for knowledge is power. YCC is committed to empowering our young people so that they can face the future with confidence.

City of Roswell – Urban Forestry at Roswell Zoo

Figure 1. Proposals Submitted vs. Proposals Funded

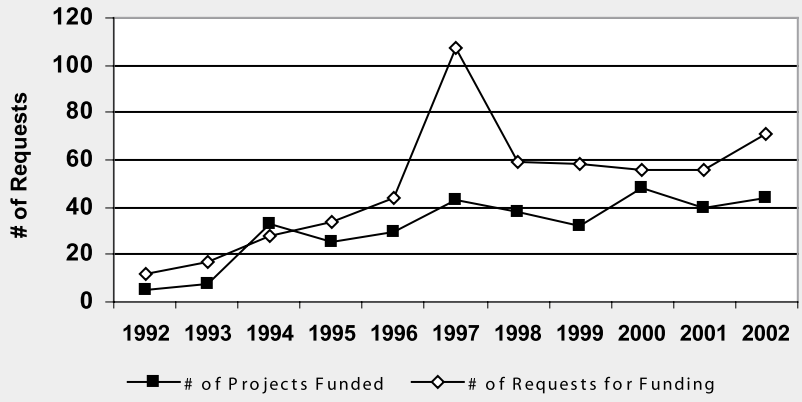


Figure 2. History of Youth Employed